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THE
CIDER
MAKERS'
MANUAL

A PRACTICAL HAND-BOOK,

WHICH EMBODIES

TREATISES ON THE APPLE; CONSTRUCTION OF CIDER MILLS, CIDER-PRESSES, SEED-WASHERS, AND CIDER MILL MACHINERY IN GENERAL; CIDER MAKING; FERMENTATION; IMPROVED PROCESSES IN REFINING CIDER, AND ITS CONVERSION INTO WINE AND CHAMPAGNE; VINEGAR MANIPULATION BY THE SLOW AND QUICK PROCESSES; IMITATION CIDERS; VARIOUS KINDS OF SURROGATE WINES; SUMMER BEVERAGES; FANCY VINEGARS, ETC., ETC.

BY J. S. BUELL.

REVISED EDITION WITH ADDITIONS.

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PREFACE.

THE object of this work is sufficiently indicated by its title. It has grown out of the exigencies of the times, occasioned by the great attention which has heretofore been given to the production of many kinds of labor-saving machinery, and which has also more recently been especially directed to the subject of Cider making.

As public attention was being gradually diverted in the latter direction, new developments were taking place in the perfection of machinery having for its object the perfect reduction of fruit into an impalpable pulp. Then another necessity arose. which demanded suitable appliances for extracting in the most rapid manner the juices from such pulp or pomace, and by such means as would involve the least possible amount of manual labor.

This also being accomplished through the introduction of lever attachments operated by machine power, in connection with screw-presses and the improved auxiliaries thereto, in fixed press curbs, cloths and movable frames, resulted as might have been expected in great economy, not only in the general expenses previously incurred for labor, but also in a large saving of material and measurably enhancing the profits through increased production, besides utilizing the waste. This led many to promulgate the discovery, and we being somewhat prominently identified with these various improvements, it has resulted in our being besieged from all sections of the country for specific information, which has necessarily compelled us in self defence, as it were, to issue the following pages under the title indicated.

We have endeavored in the preparation of the "CIDER MAKERS' MANUAL" (as we believe it to be the pioneer publication in the interests of this particular branch of American industry and literature), to make it in every respect, all that practical men can desire, purposely avoiding as far as possible all technical phrases, thereby bringing it to the understanding and within the comprehension of all classes; endeavoring also, to make every point clear and distinct by reiterating general philosophical and chemical principles, and such only, as have been recognized by the best standard authorities.

While much of the information contained in this volume may be found scattered over a wide field of literature, and while considerable research. as well as time and labor, have been required to compile it in its present form, we cannot say but that we have derived great satisfaction from the investigation, in the discovery of the great unanimity of all the writers upon the points we have presented, which therefore may be considered as fairly established In making these compilations we have not only given the idea, but have in several instances given the exact phraseology also, as it seemed more appropriate than any we could devise of our own.

We make this acknowledgment, for the purpose of rendering the proper credit, and expressing our obligations to the various authors who have thus indirectly and partially aided us in this undertaking.

We cannot, however in making these acknowledgments, but necessarily assume for ourselves some credit for conceiving and demonstrating through their well known practical results, the utility of the peculiar machinery, and many of the several devices which have been introduced into this work; also for the application of of many of the substances which have been indicated, together with the localities where they may be obtained, many of which we have ourselves visited and acquired the knowledge imparted by personal observation

While the general reader will find much that may be interesting, we feel assured that many things have been introduced which heretofore have only been known to comparitively few, and which are now made public for the first time. The information thus imparted has been derived from experiments and a personal acquaintance with the particular branches to which it relates.

Our endeavor has been to withhold nothing, but on the other hand to furnish the fullest and most complete information upon every branch which was comparatively new, thereby exhausting the subject. If anything, therefore, has been omitted, it has been done under the supposition that it was a matter with which most persons were familiar.

The works which have been mainly consulted in the compilation of the following pages, are: Dr. Chase's Practical Suggestions; Silliman's Chemistry; Dr. Feuchtwanger's Treatise on Fermented Liquors; Charles Reemelin's Wine Makers' Manual; Dr. Wetherill's Treatise on the Manufacture of Vinegar; Mackenzie's Practical Library of Useful and Domestic Arts; Campbell's Practical Cyclopædia; Appleton's New American Cyclopædia, with many agricultural periodicals, and other practical and scientific works.

THE AUTHOR

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GENERAL INDEX.

ADVERTISMENT

THE

Cider-Makers' Manual.

INTRODUCTORY CHAPTER.

General observations on wine and its uses.—Wine from the apple not generally appreciated.—Cider not the wine of the apple.—Various fruits which may be used in wine making.—The Saccharometer.—Measurement of fruit juices.—Alcoholic strength of fruit juices, etc.

A desire prevails for a more intimate acquaintance with all the processes of converting fruits into palatable drinks, called wines. And the desire is daily being strengthened by the evidences furnished from information derived from practical experience, in reference to the nutritious and beneficial qualities of such wines. As true knowledge upon this point becomes more generally diffused, it will be ascertained as Reemelin says, "that in the use of wines, as in other things, the probability of abuse does not necessarily sustain rules of total abstinence; and that alcohol or wine spirits generated by fermentation in the juices of fruits, is neither more nor less than a form of advanced digestion coming in aid of our stomach, which nature always produces whenever and wherever hydro-carbonates exist in fruits, coupled with vegetable acids and fermenters. The only danger there is about wine spirits, is that they require but little digestion. They contain in the easiest adaptable form, two of the chief ingredients for furnishing man with the material for warming his body, viz: carbon and hydrogen. When pure distilled spirits are taken, it feeds man too easily, and of course renders the stomach and its assistants too lazy; just as a too willing horse in a team is likely to make the others lazy. In time, man by indulging his stomach will increase alcoholic nourishment, and neglect the other kinds until his stomach absolutely refuses to digest, and *delirium tremens* ensues. This is so because no nitrogenous food and phosphates have been given the system, so as to resupply the wastes in flesh and bones; and there is therefore in the system, not only a want of proper supplies, but also an unwillingness or incapacity to supply them by digestion. This brief explanation will show why liquor after a meal is less injurious than before it, and why alcohol is more agreeable to old age than to youth. It will also suggest why all liquors are so good to tired men. Many fits of indigestion are generated in Americans by rich meals after hard work. We forget that when the whole body is tired, our stomach then is necessarily in the same condition. A man may be hungry and good meals may taste very good to him, but in such cases the stomach is a gay deceiver; it lies for the whole system, and craves more food than is really necessary. Thus instead of a little less food he gets too much, and being tired of course soon gets sick of the load he has taken up, and the consequence is, an improper stomach fermentation ensues. Now a small glass of liquor, or better still, a glass of good wine or cider is exactly the food suited to a tired condition. It furnishes food which requires least work from the stomach for assimilation. It does it quickly, which is a great consideration, and satisfies the more interior parts of the system, which therefore cease to importune the stomach. Wines are better than distilled alcohol, because they contain more of the ingredients necessary for the human system, in the vegetable acids, salts, ethereal oils and nitrogenous substances, and proportionally less alcohol, and that in a less stimulating form."

The country is flooded with publications which relate to the preparations of wine from grapes, and it is but fair to presume that there exists no general want of information in that respect, while on the other hand, it cannot be denied, but that there has been great neglect in the dissemination of the right kind of knowledge, respecting the correct modes of manufacturing wine from the apple. Why such has been the case we can only conjecture. A general impression has long prevailed that as a wine producing element the apple possessed no value, and the few persons having knowledge to the contrary, may have acted upon the supposition that it was for their interest to foster that idea. Most persons are familiar with the juice of the apple under the name of cider, while an exceedingly limited number know any thing about the wine which may be obtained from the apple. Some writers distinguish cider as the wine of the apple, which is a mistake; cider in one sense is no more the wine of the apple than vinegar is; cider is the juice of the apple, and as such, is crude, harsh, and often times unhealthy and unpalatable. Upon these points there is a great want of practical knowledge and general information; therefore the object of the chapters which follow, will be to convey a correct impression upon all disputed points, relating to the manufacture of cider for wine.

Beside the apple and the pear, there are many other fruits which are likewise applicable to wine making. Among these may be named currants, gooseberries, mulberries, elderberries, cherries, oranges, dates, pine apples, raspberries, strawberries, etc.; in fine, the expressed juice of any fruit, which contains saccharine matter or sugar and the ferment, may be converted into a wine.

But in order to make the same resemble the standard wine made from grapes, various ingredients have to be added, as for instance: an acid, spices, coloring, and an astringent to replace the extractive matter. The acid generally used is the tartaric, and elderberry or whortleberry juice is used for the coloring, while the water used in the manufacture of wine should in all cases be pure and soft.

Again, most of the fruits contain less sugar than grapes, and more free vegetable acids, though very few, if any, tartaric acid. The saccharine principle contained in the extracted juices of various fruits are determined by the Saccharometer.*

Balling, in his wine book, gives the following measurement of fruit juices as indicated on the saccharometer. Pear juice 8, Currant juice 10, Raspberry juice 10½, Strawberry juice 10½, Gooseberry juice 12, Apple juice 13, Sweet Cherry juice 18, Sour Cherry juice 19, and Prune juice 19. The above measurement is probably the average standard, but there is evidently a mistake in the measurement of cider. As in late made ciders, we have seen samples that measured as high as 24 from the first pressing, and where the Cheese had been allowed to stand upon the press for ten or twelve hours, the last cider extracted would not measure more than 17. Possibly where the juice and pomace have been allowed to lay in a tub, and ferment for forty-eight hours, the measurement would not average more than 13, as given in Balling's table. If 20 is taken as the standard for good wine, then the table indicates which of the juices must be helped with sugar or by evaporation to bring them to the proper strength. As the sugar or saccharine principle contained in the several juices are subsequently converted through fermentation into alcohol and carbonic acid, it may not be wholly uninteresting to know the quantity of alcohol contained in fruit wines, which ordinarily average about ten per cent. Cider has a specific gravity of 0.977 and contains ten per cent. of alcohol. Pear wine and elderberry wine the same. Gooseberry wine has a specific gravity of 0.985 and has eleven per cent. of alcohol. Currant wine has a specific gravity of 0.976 and contains 19 per cent. of alcohol. We might introduce tables giving the alcoholic strength of various liquors and wines, but in a work of this kind relating almost exclusively to products derived from the apple, we are unable to discover any necessity for them. The subsequent chapters which treat upon the apple, cider mills, cider mill machinery, seed-washers, the construction of cider mill presses, ferments, substances for the fining process, cider making, treatment of cider, manufacture of vinegar, etc., are intended to convey all the information necessary to enable anyone to successfully made, manage and manipulate all the liquors described, also to enable each and every one to avail himself of the profits which may be derived from the information which has been presented.

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* The Saccharometer is an instrument for ascertaining the quantity of saccharine matter in any solution, as the juice of a plant, or brewers' and distillers' worts. The Common saccharometer of the brewer, is an hydrometer, adapted by its scale to point out the proportion of saccharine matter in a solution of any specific gravity.

CHAPTER I.

The Apple; its origin and how cultivated.—Its uses.—Best varieties.—Mineral Analysis.—Soils natural to its production.—The Apple Borer.—The Wooly Aphis.—The Caterpillar.—The Apple Moth.—The Bark Louse, and other vermin; how destroyed.—Sources of revenue considered.—Increase of production recommended.—Its adaptation to Champagne, Wine, Cider and Vinegar manufacture, etc.

Little is known regarding the origin of the apple, but, from its being mentioned in the Bible, many suppose it to have been a native of Palestine. The term apple, as used in the Scriptures may have had a different signification, and referred as some commentators have suggested, to any fruit emitting fragrant odors.

Whether or not, the parent of all our apples, was the wild crab of Europe, as has been generally supposed, there can be but little question, but that the two hundred varieties, and over, known to us, were derived from the apples of the mother country.

While we have several varieties of the crab apple, indigenous to our own country, it has been quite clearly established that none of our valuable varieties has originated from that source; at the same time it is assumed, and generally conceded, that the cultivated varieties with which all are more or less familiar, and which are so acceptable to man, all sprang from wild fruit.

Some kinds of fruit growing wild, are not benefited by culture, while the simple removal of others from uncultivated to tilled lands, will cause a radical improvement.

Seeds of wild trees sown in rich soils, mechanically in good condition, will produce trees of an improved character, bearing fruit, which yields a larger quantity of pulp than the wild tree, and generally of a better quality. The seeds of these when sown under the most favorable conditions will yield still finer fruit, until a certain point of excellence is attained, when, the central energy of the tree being expended, it gradually returns to its original wild condition. When a good variety of fruit is obtained by culture or by accidental discovery, it is multiplied indefinitely by the processes of grafting, layering and budding. In this way have all our choice fruits been obtained and finally perfected. The laws which have been unfolded by the sciences of vegetable physiolgy and anatomy—together with the established truths of improved culture—point to vast changes yet to be wrought in fruit production for man's benefit. By thorough attention to the selection of the best varieties of trees, and their culture, the product of an acre may be readily doubled and even quadrupled, while it should be remembered that the conditions which produced a given variety of fruit in its present perfection must be again established, to reproduce or continue it. Among the great variety of apples known to us, selections have to be made which will embrace those kinds best suited to certain districts or localities; as experience has demonstrated that certain varieties which prove most excellent in one locality may prove entirely worthless in another. So that conditions of soil as well as climate have to be taken into consider ation, as soils in their natural state produce trees adapted to their peculiarity of constitution. Thus we have the wild crab, plum, peach, orange and other kinds of trees, growing in localities where the soil and climate are exactly adapted to their wants, and indicating the character of the soil best adapted to the culture of apples and other tame fruits. It is known that the rich soils of the Western States yield apples unequaled in size, but inferior in quality, to those produced on eastern limestone soils, or where the vegetable matters form a less considerable element, and red oxide of iron occurs most frequently. The apple naturally is a hardy, slow growing tree, wood close, and fine grained, delighting in limestone soils and deep loams, resting on ridges with north or northeastern exposures or upon elevated table lands. It does well on all soils free from excessive moisture, other than those of a peaty or purely sandy character. The fruit is more universally grown, and as a general rule, its uses better understood than any other. The orchard products of the United States, although immense in value and production, have not kept pace with the demand, so that at the present time these products are regarded as among the most profitable productions of the country.

Again, the tree of the apple is exceedingly tenacious of life, lasting ordinarily from fifty to eighty years, and what is more favorable, it is not subject to disease. Instances are known in many sections of the United States, where trees bearing fruit annually, are from 150 to 200 years of age. The uses to which the fruit is applied are wide and varied. Most varieties have a pleasant agreeable flavor, acceptable to all, while a few are pungent and disagreeable.

The Newtown Pippin, Baldwin, Spitzenburg, Swaar, and other equally choice varieties, are highly esteemed for dessert, roasting, boiling, making jellies, tarts, pies, preserves, sauces in the form of apple-butter, or the famous *raisine* of the French.

The expressed juice of well selected apples, *properly prepared*, forms a lively sparkling liquor, far superior to many wines. In its crude condition, the juice of the apple, contains in watery solution a large quantity of saccharine matter in addition to various vegetable proximates; and a removal of the latter in a thorough manner has been the aim and chief object of refiners and wine manufacturers.

The most noted varieties of apples said to possess peculiar and natural properties for the manufacture of refined cider or wine, are the Harrison and Canfield, of New Jersey, from which the celebrated Newark (N. J.) cider is made. This fruit is raised upon the ridge between Newark and Elizabethtown, known as a red-kellis hard-pan soil.

While the Harrison and Canfield apples possess extraordinary qualities for cider making, as a dessert fruit they are regarded of little value. Their juices, however, are said to contain a much larger per centage of alcohol, than almost any other kind of apple, and hence the secret of their high appreciation for the purpose mentioned.

The high reputation of this fruit, may have been augmented by the mode of treatment, the juice or *must* received in its early preparation, which for a long time has been, and still is, at the present time regarded by many as an important secret; but this idea with the aid of science, and the new processes now being developed must soon be dispelled. With the dissemination of practical knowledge upon this subject, it is quite certain that in many respects other varieties of the apple will be found equal, if not superior, to the Harrison and Canfield for cider or wine making.

As to the varieties recommended as worthy of general cultivation for summer use, we find mention has been made of the American Summer, Pearmain, Early Harvest, Early Strawberry, Large Yellow Bough, Red Astrachan and Summer Rose. For autumn use: the fall Pippin, Gravenstein and Porter. For winter use: the Baldwin, Bullock's Pippin, Dominion, Jonathan, Rawles', Janet, Willow Twig, Little Romanite, Limber Twig, Danver's, Winter Sweet, Fameuse, Hubbardson's, White Pippin, Minkler, Nonsuch, Lady Apple, Ladies' Sweet, Ben Davis' Melon, Minister, Rhode Island Greening, Roxburry Russet, Swaar, Vanderven, White Seek-no-further, Williams' Favorite, (except for light soils), Wine Apple, or Hayes' Wine Saps, Smith's Cider, etc.

In relation to the most advantageous soils for the production of apples, we find that question pretty well determined by a mineral analysis made by Professor Emmons; wherein from the ash of 100 parts of the sapwood of the apple, he found 16 parts of potash, 18 parts of lime, and 17 parts of phosphate of lime; and from an analysis of 100 parts of the ash of apple bark he obtained 4 parts of potash, and 51 parts of lime; thereby showing the plain necessity of furnishing a supply of these all important mineral substances to soils not well provided with them. And where apples are intended to be produced, it has been found that deep limestone lands are the best. Hence thousands of acres of hilly land might be profitably planted with the apple, where no other fruit would answer as well and other crops are grown with difficulty. If the soil is not already rich it should be made so, by the application of cold compost of manure, muck, salt, lime and ashes, and not by the use of forcing animal manures. The tree holes should be large and deep, replacing none of the uncongenial subsoil. After the tree is set at the depth it was in the nursery, the soil should be covered with loose rubbish in order to retain the moisture, over which, water or liquid manure may be poured without danger of hardening the soil. The distance between the trees should be from 25 to 40 feet,* according to the variety. The soil should be frequently stirred until the trees are several years established. If well manured with lime, ashes and cold compost, the bark cleansed with alkaline washes, the decaying, weak and interlacing branches annually removed, the orchard will improve in quality, and constantly yield a large quantity of fruit.

Occasionally, insects of various kinds attack the tree of the apple,—among the number is the borer, the wooly aphis, the caterpillar, the apple moth, the bark louse, &c., all of which should be vigilently warred against. The bark louse may be kept down by removing the dead bark from the tree, and washing with alkaline solutions.

A correspondent of one of the Chicago newspapers, (Tribune), writing during the summer of 1868, from Champaign, Ill., alluding to this subject, and referring to the bark louse, says: "At one time it was supposed that this insect would destroy all the orchards in the State, (Illinois), north of latitude 40°. But now we have no further fear; like all imported insects it spreads rapidly in advance of its enemies, but in time these overtake him and we have a war of races. This is the case with the bark louse at this time. A small insect bores a hole through the shell, lays its eggs, which hatch, and the young feed on the eggs of the bark louse; then again a small mite, too small to be seen with the naked eye, crawls under the shell and sucks the eggs of this fearful enemy of the orchard."

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* Closely planted apple orchards are more likely to do well than those in which the trees are 30 or 40 feet apart. One old orchardist say he has found the best distance to be 15 feet one way by ten the other.

"The fearful ravages of this dreaded enemy is yet to be seen on these orchard trees, but thanks to that system of balances and checks in the insect world, his career is near the end, as his enemies are swarming in countless numbers in his pathway which will soon lead to the perpetual extermination of the bark louse.

The borer may be attacked with alkaline solutions, in the same manner as the bark louse, at the time the eggs are deposited; afterwards, by a wire thrust into the hole he inhabits.

The apple or codling moth, may be destroyed, by gathering all of the fallen apples and feeding them to swine, or allowing the latter to run in the orchard, where they may feed on the apples as they fall, thus consuming the larvæ, before they have time to enter the earth. The moth is a more recently imported insect than the bark louse, and has generally infested the orchards throughout the west, and has seriously damaged the fruit,—first, by making a large part of it prematurely fall to the ground, and secondly, by worm-eating the ripe fruit, and boring holes through, making it unfit for use. The remedy mentioned, of picking up the punctured fruit and feeding to swine, is to cut off the breeding; but in order to make this mode effectual, all orchardists in the neighborhood should join in the crusade. Another method, practiced by many, is to wind bands or ropes of hay or straw, about the trunks of the trees, into which the insect crawls to spin his cocoon before emerging in the winged state, and before the latter transpires, to take off the bands or ropes, and burn them.

Others, again, pasture their sheep in the orchard. These keep down the weeds and grass, pick up all the fruit as fast as it falls, thus destroying the first brood of the insects. Should any escape for the later part of the season, when the fruit is sufficiently matured for vinegar, the apples may be hand-picked, excluding the sheep for the time from the orchard. This plan, wherever tried, has given promise of great success, and afforded striking contrasts in the subsequent production of fruit, between those and other orchards, not thus treated.

The caterpillars may be destroyed by removing and burning their nests, or igniting them with a flame from a camphene or petroleum lamp, thrust among the branches, by means of a long pole.

Another method, for destroying the various insects and enemies of the orchard, is to bore with a half-inch bit, one or more holes into the body of the tree, to the depth of two inches, and pack each hole full of calcined sulphur, and stop the orifice tight with wax, or a short plug, sawing the same off even with the bark of the tree. This process will not injure the tree, and to be effectual, should be done in the month of February, or before, so that when the sap starts in the spring, the sulphur will be carried into the circulation, and thereby prove fatal to the worms, as soon as they commence feeding upon the foliage.

As to protecting orchards from the ravages of mice, during the winter, it would be economy to see that no measures had been adopted, which would invite these industrious depredators into the orchard, as is frequently the case by many orchardists in leaving grass, old leaves, straw, and other substances, in which mice can find lodgment. For when these articles are kept away from the trees, mice will seldom meddle with them. For this reason it is regarded as a great mistake to manure an orchard in the Fall, with light composts, old straw, or anything else in which vermin can nest. In nearly every case, where damages have been done to trees which have come under our observation, the owners of them have almost invariably acknowledged that they had neglected to use any means to protect their orchards. Again too many depend upon trampling down the snow in the winter, so that mice cannot work beneath it; while this mode may be effectual when thoroughly practiced, yet the great trouble arises from not attending to it promptly, as while off from guard the damage is done.

It is said that by coating the trunks of the trees a foot up from the ground with equal parts of pine tar and fish oil, mice will not touch them.

The general acknowledged remedy, and one that is regarded as effectual, is to make a small compost of dirt around the bodies of the trees, for which purpose a wagon load of common clay will be found sufficient in the way of affording material for protecting an ordinarily sized orchard, and besides, requires but little time and labor to make the job complete.

From the foregoing general remarks, regarding the production, uses and management of the apple and the orchard, and the little care and attention required at proper seasons of the year to insure a good crop, it appears somewhat surprising that more attention has not been directed to this important branch of husbandry. In some sections of the country, however, this subject is becoming much better understood, and farmers have learned of late years that the most profitable part of their lands lay in the productions of their orchards, so much so, that the price of their farms has been measurably governed by the number of their apple trees. Yet the revenue derived from the orchard has been mainly from the sale of the good fruit for shipment, and feeding the inferior quality to swine for fattening purposes. The quantity of apples barreled and sold indicates that an immense trade has grown up in this branch of the business, and the appreciation in price during the last decade also indicates a deficiency in the supply together with an aggregation of profit. That such is the case, is evidenced from the fact that shipments are annually being made to all parts of the civilized world, and so superior is the fruit of our own country, that in Covent Garden Market, London, it commands almost fabulous prices. Ordinarily, the fruit grower feels amply compensated for his investment and labor, whenever he is enabled to realize at the rate of from fifty to seventy-five cents per barrel for his apples delivered in the orchard, as the income thus derived is mainly regarded as so much profit, thereby losing sight of the important fact that a much larger per centage of profit awaited his action, and which might have been made available from the same source, with comparatively a trifling outlay for suitable machinery and fixtures.

The nature of this expense will hereafter more fully appear, and should the exposition have the effect to stimulate an increase in the production of the apple, on soils best adapted to that purpose, and thereby lead to a corresponding increase in the manufacture of healthy beverages, it will undoubtedly do more, as a co-operative measure, to suppress vice and intemperance, than all of the stringent prohibitory laws that can be enacted. The business of apple culture, in that event, will not be overdone, for such results cannot possibly follow, in view of the large emigration and natural increase of our population, as with these naturally follows the greater consumption. And with the appetite of man, demanding not only a luxury but a necessary article of diet, essential to the well being, health and comfort of the human family, the demand must necessarily, for many years in the future, greatly exceed the supply.

As an article of diet, a more healthful, invigorating drink cannot be obtained from any source, and at less expense, than from the juice of the apple. The apple is the natural wine producing element of this country; while for medicinal purposes, in many complaints, the wine thus produced has no equal, the essential requisites being that it shall be pure, unadulterated, and not mixed with distilled, fermented, or intoxicating liquors, or poisonous drugs of any description. That this can be accomplished, is becoming generally understood. The evidence is presented with the acknowledged fact that the larger proportion of the so-called champagne wines sold in this country, and which command such extravagant prices, are nothing more or less than the manipulations of cider or the juice of the apple.

The preparation of cider for champagne dealers, belongs properly to the manufacturers. Yet the manufacturer and orchardist may be identical, although not necessarily so. The whole business of raising the apples and manufacturing cider and preparing champagne could profitably be conducted by the fruit grower, thereby monopolizing the whole profit. Yet the simple preparation of the juice of the apple for champagne purposes alone affords such profit as usually satisfies the more greedy, as the prices realized per gallon, range from forty to sixty cents, while the actual outlay for labor and material after the juice of the apple has been obtained, necessary to produce a good article of champagne cider will not exceed three cents per gallon.

Another source of profit from the products of the orchard, heretofore little regarded in view of its importance and which has uniformly been allowed to waste, is the pomace, after the cider has been extracted and the lees of the apple juice, which can be profitably converted into acetic acid or pure cider vinegar.

In the usual forms of expressing the juice of the apple from the pomace, there is remaining from eight to ten gallons of material to every barrel of cider extracted, which is readily convertable into vinegar for domestic use. It is estimated that if seven-eighths of all the cider manufactured in this country, was converted into a pure article of cider vinegar, it would not meet the existing demand for that article alone. For the want of the pure article, the market is supplied with adulterations and various mixtures, detrimental to health, which in a great measure, might be avoided by economizing in the saving of material, heretofore absolutely wasted. Pure cider vinegar, that which is absolutely such, commands highly remunerative prices in market; and well it may, in view of the many deleterious compounds offered to the public and denominated manufactured vinegar.

Still another source of profit derivable from the apple, is the seed, which usually commands in market, varying of course with the season, from six to ten dollars per bushel. The seed is used for manufacturing and nursery purposes, and is readily obtainable from the pomace of the apple after the cider and material for vinegar have been extracted. About one hundred and fifty bushels of apples furnish a bushel of seed.

In making compost for fertilizing purposes, the value of the pomace or cheese derived from the apple is well understood by farmers, so that no portion of the apple should be allowed to waste, possessing as it does so many valuable properties.

The limits of this publication will not permit us to extend our remarks in relation to this interesting branch of the subject. But from what has been stated, as well as from that which follows, certain deductions may be drawn, and we trust such as will invite experiment and lead to profitable results.

In conclusion, we would add that we do not claim or wish to be understood that all orchardists should devote their attention to cider, wine and vinegar manufacture; yet the profits derivable from that source are within reach of every proprietor of apple orchards, and can be made available if desired. On the other hand, we make the suggestion that each and every owner of a cider or wine mill engaged in the manufacture of cider, champagne or vinegar, should endeavor to possess one or more apple orchards, in view of the various advantages derivable from such an arrangement.

CHAPTER II.

The Cider or Wine Mill; its early history.—The English Cider Mill.—The Nut Mill, and how constructed.—The Grater Mill.—Hickock's Portable Mill.—Existing defects in the construction of Graters and Crushers.—Improvements therein.—Buell's Combined Grater and Apple Crusher.—The Cider Press.—Construction of Cider Presses.—The Wooden Screw.—Iron Screw.—Operating Screw Presses by machine power.—Gearing and Levers.—Buell's Improved Screw-press.—The Press Curb; how constructed.—Laying the Cheese.—Use of straw ignored.—Cloths and frames recommended.—Frames; how constructed.—Seed-Washers, &c.—The Hoisting Machine.—The Force Pump.—The Model Cider Mill, and how constructed.—Buell's Portable Wine and Cider Mill, etc.

The primitive mills used in the manufacture of cider, involved no expensive outlay for buildings. The limited quantities made, enabled the work to be accomplished during favorable weather, and recourse was naturally had to the orchard, as being the more convenient place.

The earliest appliance known, which in this day of improvement has become obsolete, and which would require an extremely fertile imagination to designate a mill, was simply a trough, in which the apples were reduced to an imperfect pomace by rolling them with a heavy cylindrical stone, or by pounding them as in a mortar.

An improvement was the production of the English cider mill. This consisted of a pair of coarsely corrugated iron cylinders, from which the apples fell to a second pair, close together and finer in their surfaces, and passed through finely mashed to the pomace vessel underneath.

The principal mill in the United States succeeding the trough just mentioned, and the one generally used until within a few years, was known as the nut mill. It consisted of a pair of upright log cylinders, 16 to 20 inches in diameter, properly adjusted for revolution, and close together in a strong frame work. At the upper end of one of these cylinders was affixed a strong lever, which extended to the horse circuit, where the proper power was applied. Upon the surface of one of these wooden cylinders were two or three lines of cog-like projections spirally arranged, which served the double purpose of clutching in the apples and turning the other cylinder by means of properly formed cavities mortised into its circumference. The machine was completed with the addition of a box or hopper arranged to receive the apples, and to conduct them to the cylinders, where they were subjected to a thorough mashing. The next improvement, and which at the time of its introduction created considerable public interest on account of its simplicity and novelty, was the grater mill, which first became known about the year 1825, and is said to have been invented in the western part of the State of New York. This mill consisted of a horizontal cylinder some 10 or 12 inches in diameter and about the same length, which was armed with numerous short spikes, and revolved at a high velocity under a concave similarly spiked, so that the apples in passing between these surfaces were subjected to a grating rather than to a crushing process, as in the machine previously described. In 1852 Mr. W. O. Hickock, of Harrisburg, Pennsylvania, invented a portable cider mill, which consisted of a pair of small horizontal cylinders, armed with small spirally arranged teeth or spikes, revolving close together, one at a higher velocity than the other. The apples were first broken by the action of a coarsely fluted roller, which revolved against a table under the hopper, and after passing between the cylinders, the apples were not only bruised but also grated into the required pomace. This machine was capable of grinding one hundred bushels of apples per day. It occupied only the space of a few feet, and was easily transported on a light wagon from one neighborhood to another, as might be desired. This mill was for a time in high repute, and the inventor was enabled to sell as many as a thousand of them during one season. Since that time numerous modifications have been made in the plan of Mr. Hickock's mill, some being simply spiked cylinders, against which the apples were carried and held till grated by reciprocating plungers. A great variety of designs, intended to be operated by hand-power, for family use and making cider in a small way, are being extensively manufactured and offered for sale by most American agricultural implement makers and dealers throughout the country.

Our limits will not permit us to notice all the various styles of portable mills before the public, or the multitude of graters or apple grinders, many of which possess excellent points and are worthy of commendation. As a general rule, however, the great majority of these implements for cider making are deficient in the essential principles necessary to a perfect machine. In the first place, where rapidity of action is necessary, all of these machines require correspondingly greater motive power, which involves additional expense, and the power requisite for one of the small machines would be sufficient to drive a mill capable of accomplishing ten times the amount of work. In the second place, in order to be profitable, it is necessary that the mill should be so constructed as to obtain the greatest amount of apple juice possible from any given quantity of apples; and this, aside from the pressing necessary, can only be accomplished by a thorough breaking of the cellular tissues of the apple. These cells are extremely small and numerous, and the apple must be reduced to an impalpable pulp in order that all the juice may be extracted. The majority of machines do this work very imperfectly. The great objection to them arises from the fact that they have been so constructed as to cut the apple into shot-like particles or cubes, which contain in their cellular tissues a considerable portion of the apple juice, and are not subsequently broken when placed in a mass under the heaviest pressure. This difficulty can be partially overcome by the chemical action of the atmosphere upon the mass, which has a tendency to decompose these small particles or cubes, thereby separating the wooden fibre of the apple and allowing the liquid held in combination to escape. But this operation requires time, and is objectionable in many other respects, particularly so for wine-making, as the oxidizing effects of the atmosphere increases or heightens the color of the extracted liquor. Many practical cider-makers, however, adopt that course, and allow the pomace to lie from 24 to 48 hours before pressing, in order, as they claim, to heighten the color, but really for the purpose of securing a larger quantity of cider. A greater quantity might be realized just as well in the first instance, and without the objectionable oxidation, if a proper mill for preparing the pulp were used.

Some manufacturers of grater mills or apple grinders substitute knives or blades, which are affixed to the revolving cylinder, and instead of cutting the apple into the small cubes before referred to, scrape the apple to an impalpable pulp. As a general practice this plan is best. No difficulty, however, exists in accomplishing the same result with the grater mill when properly constructed. The teeth or spikes, which are made expressly for that purpose, with a chisel head (as shown in the engraving, fig. 1, which represents the full size, and may be obtained at most of the principal hardware establishments at a small advance over the cost of ordinary nails), should be driven closely together in lines diagonally over the face of the cylinder, and not projecting much if any over an eighth of an inch. The spikes when so arranged form a cutting or scraping surface similar to the blades ordinarily used, and by many are regarded as far superior. They possess the great advantage of being easily replaced when broken out by stones or other hard substances, and thus repeated until the staves of the cylinder require to be replaced by new ones. The engraved section of a cylinder stave (see fig. 2) indicates the manner of placing the teeth or spikes, which

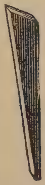


Fig. 1.

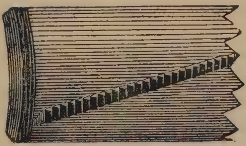


Fig. 2.

may be inserted in a uniform manner with a hammer and a setting tool, in which the head of the spike is held while being driven the required depth.

Much discussion has arisen from time to time among practical cider-makers as to the superiority of graters over crushing mills and *vice versa.* We cannot under take to recite the arguments, but this much we can say, that the ideas thus eliminated have frequently been valuable and suggestive. Those who advocate crushers claim that their tendency is to break the cellular tissues of the apple, and thereby allow all of the fluid it contains to pass off freely under the press. This has been found by experience not to be the case. The numerous infinitesimal cells of the apple cannot be broken by any crushing process alone, and at the same time effectually break the fibres or cases of all the cells so as to permit the free escape of the juice of the apple when under pressure. And unless thus effectually torn asunder their tendency is to restrain and hold as it were in a sack much that otherwise would escape. A partial decomposition of the fibre, however, previous to being subjected to the action of the press, greatly facilitates the operation and becomes essential in order to extract the juices of the apple in all cases where it has been crushed or coarsely grated by imperfect machines. Yet this decomposition, besides the oxidizing effects before mentioned, engenders fermentation, and the cider resulting from such a process cannot be regarded favorably for wine manufacture, but may be appropriately used for vinegar purposes, as will be seen in a subsequent chapter.

Grater mills have a decided advantage in other respects over crushers, and among these may be mentioned the peculiarity of their construction, enabling them to eject small stones and other hard substances. If this could be successfully accomplished with crushers, and the pulp afterwards pulverized with a grinder, such a mill would probably be the best that could possibly be constructed, as it would be both profitable and economical.

The nearest approach to anything of this kind is a grater or grinder combined with a crusher, known as "Buell's Combined Grater and Apple Crusher." It occupies but a little space, and is so unique in its construction that a detailed description may not be out of place. The accompanying illustration will serve with

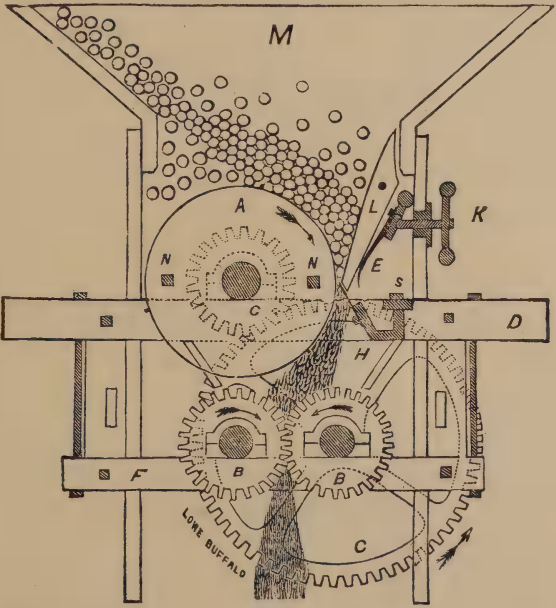


Fig. 3.

the description given to explain its construction and mode of operation.

Attached to the frame "D," (see fig. 3,) made for the support of the revolving cylinder, is another similar frame "F" underneath, at the proper distance to admit and sustain crusher rollers "B, B." These are placed below the cutting or grating cylinder "A," and are driven by gear wheels "C, C," which are affixed upon the opposite ends of the shafts from the gear wheels "B, B," the latter having a much less velocity than the grating cylinder "A." The crushing rollers "B, B," are made of cast iron, and are about six inches in diameter, and so arranged that the pomace as it falls from the grater "A," will pass between the crushers "B, B," and thence into the proper receptacle. The cylinder "A" may have knives or grater spikes, or both, upon its circumference. The heads of the cylinders are also of cast iron, and so arranged that they form with the iron rods which pass through the cylinder lengthwise clamps to hold the wooden staves in position. By loosening the nuts attached to the rods "N, N," the staves of the cylinder "A" may be removed and replaced by others, being only the work of a few minutes. Upon the frame "D," and placed below the center of the cylinder shaft and on a line therewith, is a cutting bar "H," made of cast iron, which is adjusted by a set screw "S" at any required distance from the face of the cylinder "A." Attached to the face of this cutting bar by bolts. is a thin steel blade, the upper edge of which is parallel with the center of the cylinder shaft. Near the top of the cylinder box and under the hopper is a thin cast iron bar some four inches wide, hung by circular projections extending from the ends near the top, and fitted to proper bearings, so as to enable it when not fastened by the hand screw "K" to swing freely. Attached to this bar, and firmly bolted thereto, are several flat steel springs "E," about one and a half inches wide, which extend down and are brought to bear against pieces of wood "L," of corresponding width. These latter, which are pressed against the back side of the steel blade attached to the cutting bar "H," are held in position by a half-inch iron rod at the top, and are free to move backward against the yielding springs when small stones and other hard substances are driven out. The hand screw "K" is used to tighten or stiffen the force of the springs, and regulate their action as may be desired. The cylinder "A" is about 12 inches long and 10 inches in diameter. The apples are supplied through the hopper in the usual manner, and should a stone be accidentally introduced, one or more springs yield sufficiently to eject it, and no injury follows with the exception, perhaps, of a few broken spikes, which are easily replaced.

With the exception of the crusher rollers "B, B," gear wheels "C, C," and frame "F," the foregoing fully describes Buell & Brother's imperial grater, introduced during the Fall of 1868. They also manufacture other kinds of graters, but those of which a full description has been given are the best.

THE CIDER PRESS.

Of all the machinery connected with the cider mill, the cider press is regarded as the most important auxiliary to the business of cider-making. Devices which relate to the reduction of the apple to an impalpable pulp have received much attention, and a high state of perfection has already been attained. It is fair to presume that little opportunity is left for any further improvement in that direction. More attention therefore has of late been devoted to the cider press, as since the introduction of graters for grinding the apples, the heavy and laborious work in a cider mill has been principally confined to the cider press. Before the introduction of screws, the method of extracting the juice of the apple was by the use of heavy weights, wedges and leverage. Until within a late period a large wooden screw was used, and even now in some sections of the country is still in use. Of these screws, two, and oftentimes three and four, set in a strong frame work of double timbers, were found no more than sufficient to separate the cider from the pomace. In order to operate these screws a long heavy wooden lever became necessary, which required the united services of four or five men to handle, and not unfrequently the strength of a yoke of oxen was called into requisition before the work could be accomplished.

An improvement upon the wooden screw was made by the substitution of the iron screw and iron nut, which was found to answer all purposes so much better than was at first anticipated that the iron screw has almost entirely done away with the old style of wooden screws. There is still the objectionable feature of having to handle heavy and cumbersome levers, making the labor irksome as well as expensive.

For the purpose of overcoming this difficulty, several devices have been tried, as, for instance, toothed wheels operated by gearing, and by similar appliances for turning the nuts instead of the screws. But all have been tried with indifferent success, and not unfrequently under a heavy pressure some portion of the gearing would break, and those using such appliances would be compelled to return to the use of the lever, the method now generally prevailing. In the Fall of 1867, the inventors of the grater before particularly described conceived the idea of operating screw presses with a lever by the means of water power. They fitted up a press containing a heavy iron screw, which was successfully operated during that and a portion of the following season, when the press frame, becoming somewhat decayed, gave away. The same was replaced with a new frame and two smaller screws, operated in like manner, which continued to work throughout the balance of the season with the most satisfactory results. For their improvement in the mode of construction and operating screw presses, Letters Patent were granted them on the 24th of November, 1868. A considerable number of these improved screw presses have been sold through out the country, giving entire satisfaction in every instance to the purchasers and to all who have witnessed their operation.

The subjoined engraving represents a press with two screws, as operated by water or any machine power, also the mode of attaching the lever to the screw. Upon the head or end of the screw (see letter "A" in the engraving,) is a ratchet wheel some ten inches in diameter, firmly fixed with keys thereto; and immediately under, encircling the screw and a portion of the ratchet wheel, is a casting (see letter "D") forming a portion of the lever. Upon this casting and held in position by a strong bolt is another movable casting, (see letter "B") which operates upon a bolt as its fulcrum, and is known as a double or right and left hand dog or pawl, with a projecting handle to place it in position. Within a box or aperture in the casting, over which the handle of the pawl projects, is a slide (see letter "C") of a V shape projecting from the aperture, which is pressed against the side of the dog or pawl by a spiral spring, and holds the same in position.

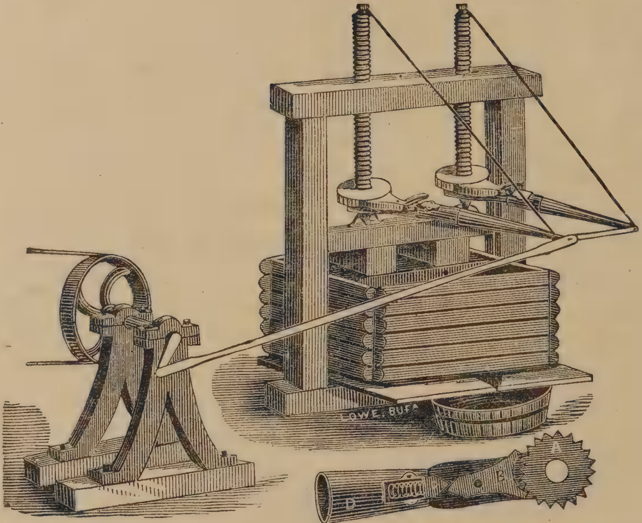


Fig .4

The lever is held in a horizontal position by an iron brace connecting the extreme end of the lever with the top of the screw, so that the lever and iron brace rise and descend with the upward and downward motion of the screw. By placing the pawl in position, and giving a forward and backward motion to the lever through a connecting rod attached to a crank and shaft, the screw is made to operate as may be desired.

The power is applied with equal facility, regardless of the position of the screw, whether it be high or low, as the lever is firmly fixed at one end to, and movable upon the head of the screw, while at the other extreme end of the lever, all the force is applied, and by a simple and ingenious arrangement, regardless of the direction of motion, the screw is raised or lowered, as may be desired, by simply turning the handle of the pawl to the right or left.

The follower is fastened to the screw and passes up and down with it, thereby avoiding much heavy and unnecessary labor. These attachments are susceptible of being fitted to any number of screws, and all operated by one driving-wheel, and at the same time all of the screws made to work separately or together

The press frame, (see fig. 5) may be constructed in the ordinary manner, the sill and press beam being from 16 to 20 inches square, according to the size of the screw intended to be used. The upright posts should be of sufficient length to allow a space of at least seven and a half feet in the clear between the sill "S" and the beam "B." The timber for the posts "P P" should be ten by sixteen inches, and the distance between the posts "P P" seven feet. There should be two tenons on each end of the sill "S" and beam "B," and each three inches wide by seventeen inches long. This length is given, as it will permit keys to be used through the tenons outside of the posts, instead of wooden pins, as shown in fig. 5. The posts should extend some distance below the bottom of the sill "S," also above the upper surface of the beam "B," and the whole strongly bolted with iron rods of not less than one and a half inches in diameter, with heavy heads and nuts, as shown in the engraving.

The screws should be placed two and a half feet apart. The platform, made of three-inch pine plank, should also be seven feet square, properly grooved upon the outer edges, with suitable conduits for the cider to run from the cheese to the intended receptacle.

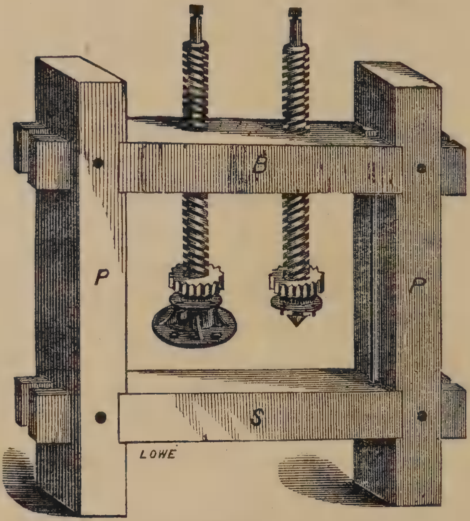


Fig. 5.

Some, construct their press frames with uprights of three, four and six-inch plank, and in the following manner:

Two bed pieces of timber, "B B," (fig. 6), ten by sixteen inches, are laid about ten inches apart upon a substantial foundation. Upon these timbers, across the ends, a short plank "D," four inches in thickness, is placed, and two other planks "E," each also four inches in thickness, seven feet four inches in length, and of convenient width to form posts, are placed upright, with the lower end of each resting upon the short planks "D," as shown in the engraving (which represents a section of the press frame.)

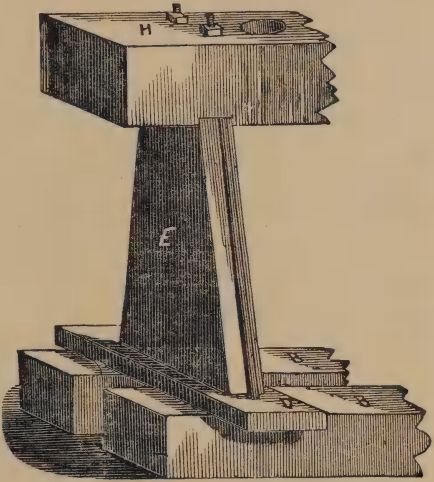


Fig. 6.

Upon the upper ends of the planks "E" (used for posts) the timber for the press beam "H" also rests, the planks "E" fitting into a shoulder cut into the press beam "H" to the depth of two inches. The whole is securely bolted together by four iron rods, each about two inches in diameter, which extend through the bed pieces "B B," at an angle, along the edges of the upright planks or posts "E," and through the press beam "H."

This mode of construction makes a cheap substantial press frame, and requires but little time or labor to build it. The main points to be considered in the construction of all press frames, are durability, firmness and strength. These being accomplished it becomes a matter of little importance how it has been done.

The levers used to operate the screws as represented in the engraving of fig. 4, may be of any length. For convenience, they are at present made partly of iron and of wood. The usual length, ranges from seven to eight feet from the center of the screw, to the extreme end where the power is applied. The arm or pitman connecting the crank with the end of the lever may also be of any length, ten feet or more, according to circumstances. The length of the crank, is governed in all cases by the length of the lever, and is so made as to be adjustable thereto. The band wheel of the crank shaft, ordinarily, is double or twice the diameter or length of the crank. The velocity or motion of the band wheel should range from forty to sixty revolutions per minute, never exceeding the latter under any circumstances, and may be as much less as desired. Every revolution of the band wheel, revolves each screw attached to the crank, one-thirty second part of its circumference, that is thirty-two revolutions of the band wheel, revolve each screw attached to the crank only once. The multiple of power, derived under this arrangement obviates the necessity of any great length of lever, while the power necessary to operate the screw is about one-fourth of that ordinarily required to grind the apples. Two screws may be operated at the same time, with the same power as would be required for one screw, which is done by equalizing the power and having it uniform at all times upon the levers. We therefore, where two screws are to be used in a press, usually select what are called "pairs," right and left hand screws. These screws being alike in other respects, are placed in such a manner that when the levers are attached, in order to run the screws down, they will swing at their ends, towards each other or together. The ends of the levers being then united by an iron or wooden strip, (sufficient space in the orifices being allowed at the ends of the levers for the angular movement), and the arm or pitman which connects the crank with the end of one of the levers, as the force is applied will alternate the screws, upon which the respective levers act, thereby securing regularity of motion.

Thus one press after another might be connected, by allowing sufficient space, between each, for length of pitman, and by having the screws in a line, the levers to all of the presses would oscillate as the necessary force was applied. If there were six presses in a line, in some, the screws might be stationary, that is, not operating, in the others they might be running up, and still in others down. This would all be regulated, by the position of the dog or pawl of the lever. If placed on the center, no motion would be imparted to the screw, if turned to the right or left, the screw would operate correspondingly.

In some cider mills, the presses are arranged so as to be opposite or facing. In such cases, the ends of the levers may project to within two inches of their opposites, while the crank of the band wheel shaft should be placed in line with the center, between the extreme ends of the levers, thereby permitting the arm or pitman, which connects the lever with the crank, to be changed from one side to the other, alternating, with the presses operated.

Where the machinery is operated by water power, a continued pressure can be maintained during the night upon a large cheese, by leaving water enough upon the wheel, to start the machinery every time, or as often, as the cheese yields sufficiently to permit it.

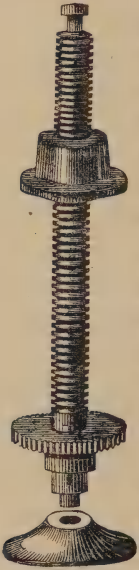


Fig. 7.

The proper length for an ordinary screw (see fig. 7) is four feet and six inches. The thread should be cut three feet and ten inches. The spindle at the upper end, to hold the brace may be of any length to accommodate the screw to the thickness of the press beam, and sustain the brace which supports the lever. This spindle may be inserted in the end of the screw and fitted tight, or the brace may be made with an elbow, and one end, loosely fitted into the end of the screw, so as to revolve therein, while the other end of the brace should be firmly fastened to the lever.

Screws, of four and four and a half inches in diameter are the best (although three and a half are much used), and wrought iron screws, are preferable to cast iron. The latter, however, are less expensive, and can be made cheaply if cast hollow, thereby saving the weight of the iron, and not materially affecting their strength.

The nut through which the screw passes should be at least ten inches long, so that the bearing of the screw under a heavy pressure will be equally distributed upon the threads, thereby preventing a twisting or breakage of the same, also ruining the screw or nut. The thickness of the nut, including the thread, at its upper end, need not be over one and one-quarter inches, and at the shank, one and one-half inches, while the flange should be two and one-half inches wide, by one inch in thickness. The nut should be inserted in the beam perpendicularly, and fitted with exact nicety. The bearing should be upon the end, and not wholly upon the flange, and it should be securely fixed to the beam in such a manner as to prevent any movement whatever.

The curb frame of the press, (fig. 8) should be a permanent fixture, and securely braced at its sides and ends. The frame can be made of scantling, of about four and a half to five inches square, halved together at the ends. The slats, made of one and one-quarter inch, hard-wood plank, by two and one-half inches wide, should be three and a half feet long, and firmly spiked to the frame in an upright manner.

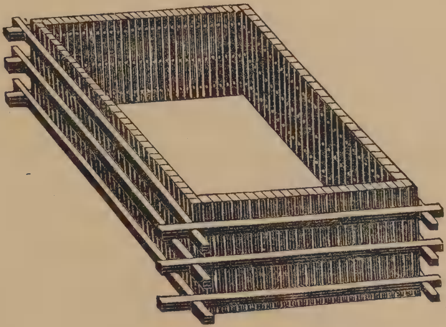


Fig. 8.

The curb frame, should be made in sections, sides and ends, and then, put together upon the platform of the press, where the sides and one end, should be securely fastened. This would leave the other end free, to be used as occasion might require.

In laying the cheese, great care should be exercised that it be done in such a manner, as will allow the free passage of the cider from the pomace. The primitive custom, was to lay upon the platform a quantity of straw, upon which, a quantity of pomace was placed, and the edges secured by laps of straw, thus alternating straw and pomace, until the pile was complete. The object of using the straw, was to hold the mass together while it was being submitted to a pressure, and also to serve as a means of exit for the cider. But this latter purpose it accomplished very imperfectly, so that correspondingly greater pressure was required, than would otherwise have been necessary. An improvement, was in the substitution of hair cloths. But from the want of a proper knowledge how to apply them, the difficulty of procuring them, or the enhanced cost over straw, they have not up to the present time come into general use. Notwithstanding the high price of hair cloth, and the large expense as an original investment, there can be little doubt but that for a series of years, it would be the cheapest material in the end, and much better than any thing else for the purpose named. Cider makers, know, it is not an uncommon circumstance with them, that they are unable to extract the cider from the pomace, when laid up into a cheese, under the heaviest of pressure; the press frame will snap; occasional jets of the fluid will spirt out in various directions, for great distances, indicating that the means of egress for the fluid is not sufficient for its escape, and time, therefore has to be given, (with the employees waiting,) for "the cider to run." Those more impatient, adopt the method of relaying the cheese and adding more straw, which measureably relieves the difficulty. We are among those, however, who contend that straw, should not be used under any circumstances for cider making. In the first place it is a waste, both of straw and cider. The straw is liable to be foul and musty, thereby imparting unpleasant odors to the liquor. And in the last place, there is no necessity for its use, and it is better to dispense with it altogether. Our substitute, would be gunny cloths, hop or wool sacking. We have used gunny cloths with entire satisfaction for several years past, and find them to answer nearly as well as hair cloths, and are much superior to straw in every respect. We usually lay, in the first place, two thicknesses of cloth upon the platform, after having encompassed the inside of the curb, with one thickness of the same, we then spread over the bottom of the curb, pomace, to the depth of from three to five inches. Upon this two more thicknesses of cloth are laid, and the same quantity of pomace, alternating cloths and pomace, until the curb is filled. The cloths upon the sides are then laid over the top, with two more thicknesses, upon which, planks are placed, and the necessary blocking added, ready for the screws to be put in operation. The practical effect of using two or more thicknesses of gunny cloth is, that it allows the cider to pass through them, also to serve as conduits through the means of the meshes, for the fluid to escape. This, it will be borne in mind, cannot be done with one thickness of cloth, and hence the failure of all those who have not succeeded in the use of hair and other cloths.

To ensure success in this matter, we conceived the idea, about the time of closing up cider making, in the fall of 1868, of a plan, for the use of any kind of cloths, which would secure the expression of the apple juice, in the most rapid manner, and it became in its practical operation, exceedingly satisfactory.

The plan adopted, may be explained substantially as follows: Make several frames, of lath or thin boards of one-eighth or three-sixteenths of an inch in thickness, and of the length of the inside of the press curb, by first cutting the pieces in strips of about one inch in width, and laying these strips upon a table or bench, side by side, leaving about three-sixteenths of an inch space between them, until the width of the curb is reached. Then place upon the top, at right angles, similar strips, side by side, leaving the same space between them until the lower strips are covered. Tack them securely together with short copper nails, and the frame is complete (see fig. 9). Or if the curb to the press be large, this frame, may be made in sections, quarter or half size, which might be more convenient for handling, with less danger of breakage.

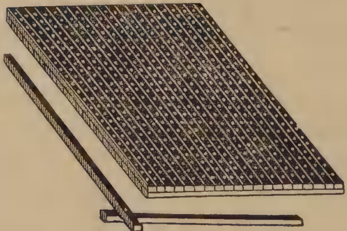


Fig. 9.

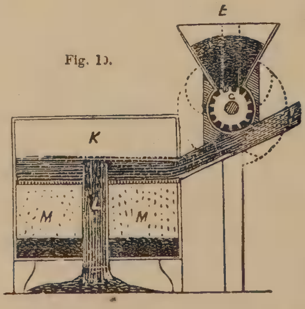
These frames, are designated and known as pomace frames, and are used in laying up a cheese as follows: First, place upon the platform of the press, one of these frames, seeing that it covers the entire inner surface of the curb. Place upon the top of this frame the cloth or cloths, at the same time covering the inside of the rack, with one thickness of cloth, laying the lower ends over the frame, and then fill in with pomace to the uniform depth, of from three to five inches, Then lay on cloths, and upon the cloths place another frame, upon which, lay other cloths, and add three to five inches of pomace, thus building up successive layers of frames, cloths, pomace, cloths, frames, cloths, pomace, alternating in like manner, until the curb is filled, and then proceed as before described.

The frames, separate the cloths and allow the free passage of the cider, from all parts of the cheese through and between them, while the openings between the slats of the frame, act as conduits for the liquid to the outside receptacle. But a few minutes only, is required to express the juice from a large cheese, and if there be room within the curb, other layers may be added and treated in like manner, before relaying the cheese. In removing the cheese from the curb, unlock and remove one end of the curb frame, after having removed the blocks, and then take hold of the cloths and remove each layer successively. Shake the cloths, and clean the frames as they are taken off, removing the dry cheese to a platform, previously prepared to receive it. The cloths, as they become gummy should be thoroughly washed, and when not in use should be dried and kept in a dry place. By this process of extracting cider from the pomace, it will be seen that the pressure upon a cheese is in all directions, top, bottom, ends and sides, and no necessity exists for cutting down a cheese and relaying it for further pressure. Besides the mill is not littered up with straw and filth, an unnecessary nuisance in all cider mills where straw is permitted to be used.

SEED-WASHERS.

No cider manufacturing establishment, can be said to be complete, without a seed-washer. In introducing the subject of seed-washers, it is assumed that the motive power used in driving the machinery for grinding, pressing, hoisting, pumping, etc., is derived from a suitable water power ; and with such a power, the necessary water can be obtained for seed-washing purposes, also, for cleaning tubs, casks, etc. Whatever the motor may be—water, wind or steam—due regard should be had in the location of a cider mill, to provide for an ample supply of water for seed-washing. The revenue which may be derived upon the sale of seeds, obtained from apples, pears, quince and other fruits, and the small amount of labor necessary to secure them, renders the saving of seed an item worthy of consideration, for all cider makers. The principal expense involved, is the picker, which is a cylinder about ten inches in diameter, and twelve inches in length, affixed to a shaft with a pully. The cylinder is fitted with short spikes, somewhat similar to the old style of apple-graters, and revolves under a concaved surface fitted in like manner with teeth or short spikes, and the whole enclosed under a hopper, through which, the pomace, after successive pressings is supplied to the picker. In order to convey a correct idea, of the necessary apparatus, we have introduced an engraving, (fig. 10), of an improved seed washer, with the following description :

Fig. 10.



This illustration represents a sectional view of the apparatus. The box

"M" is made about four feet square, and three feet high, including the cover or top. Within the cover is inserted a coarse sieve, three feet or more in diameter, which is fastened to the inside of the cover frame, which forms a rim, some ten inches high about the sieve. Within the center of the sieve is inserted the tube "L," ten inches in diameter and open at both ends, which extends some six inches above the sieve, and down through the bottom of box "M." The hopper "E" and picker "G" are supported by upright posts, and the picker "G" is driven by a band-wheel. To operate the apparatus, a belt is applied to the band wheel of the picker, and the same, is put in motion. Water is introduced into a box, indicated by the letter "K," and takes the pomace, after having been pressed and picked fine, from the bottom of the picker "G," and carries it, by its own force over the sieve, traveling some thirty feet in its revolutions, during which time the seed passes through the sieve into the box "M," while the water and particles of the pomace or cheese are carried off through the pipe "L"—All of the labor required, is to place the cheese after pressing into the hopper "E," and remove the seed from the box "M," after which, it is dried and cleaned for market.

In the above style of seed-washer, two holes are inserted in the sides of the box, under the sieve, to carry off the small particles of pomace, and thereby avoid clogging up the sieve. These holes may be two inches in diameter. The seed being heavier than the pomace, fall to the bottom of the box or receiver, when at occasional periods the water may be shut off and the seed removed. In some cases we have dispensed with the sieve altogether where we had a heavy flow of water, and obtained, nearly, equally, as fine results. The whole apparatus and fixtures are comparatively inexpensive.

THE HOISTING MACHINE,

Is an essential piece of machinery to a cider mill for hoisting apples, barrels, &c. It is constructed in various styles. The simplest, as well as the cheapest, perhaps, is a long wooden shaft with a chain, tackle-block and grapples, so arranged as to be operated with friction pulleys, and its action controlled by a handle or lever, while being propelled, by adequate machine power.

THE FORCE PUMP,

Is another implement of great service, which may be operated by hand or machine power. Rubber hose may be attached, for transferring the expressed juice, into high tubs or vats, or from one tub to another.

THE MODEL CIDER MILL,

In its construction, implies the erection of a large and commodious building in a suitable location, both as regards the abundance of fruit, and also, as accessible to a good water power, for propelling the necessary machinery. The building should be constructed, so as to accommodate the internal arrangement for machinery, fixtures, vats, &c. The best conceivable location would be by the side of a living stream of water, upon the side of a bluff, so that the building may have three floors, each of which to be made accessible to teams whenever desired, and at the same time, so arranged, that all parts might be protected from frost in the winter, and excessive heat in the summer. We shall for convenience of description, denominate the lower story the basement, or storage room, the middle story, the press room, and the upper story, the fruit room. Through the fruit room, a tram railroad about five feet high, should be constructed, along the center of the building, under which and above the floor, the room should be divided into numerous compartments, with proper partitions for the storage of the fruit. The tram or car, should be constructed so as to hold, when full, at least fifty bushels of apples, and designating lines, made in such a manner, as to determine at a glance, the actual quantity contained in the car, whether five, ten, twenty or more bushels.

The top of the tram or car, should be so arranged as to receive the fruit from a wagon, and to discharge its contents into any desired compartment, without the aid of a shovel. Under this floor in the second story, a line of shafting, with suitable pulleys, should be placed, also the mills for grating and crushing the fruit, to be driven by belts connecting with the pulleys of the shafting. These mills, should be placed in such a manner, that the tops of the hoppers would be on a level with the floor of the fruit room. Under each grater, vats, for the reception of the pomace, should be placed, in such a manner, as would permit the discharge of their contents through spouts into the curbs of the press. Such discharge to be regulated by suitable gates or slides. From the presses, proper conduits should be made as would conduct the cider to a suitable strainer, made of cloth or copper wire, and from thence into large wooden tubs, firmly fixed in the basement or storage room, each of which should be capable of holding equivalent to 100 barrels. On a platform in the rear of the presses, some six feet in width, the cheese, after pressing, should be placed, and this platform surrounded with suitable conduits, for conveying any drippings which might arise through fermentation to another tub, which should be known, as and denominated the vinegar tub, also capable of holding at least one hundred barrels. The press room, should contain at least six presses, with two screws each—three presses upon either side, and operated by one or more crank-wheels and shafts. One press, upon either side should be devoted to vinegar purposes, with conduits to appropriate tubs, while the four remaining presses should be wholly devoted to cider purposes. Within the floor of the press room and adjoining the vinegar presses, a box should be placed, through which, the cheese after being removed from the vinegar press may be conveyed to the seed-washer, placed in the basement room, which should be driven by a belt from the shafting above. The water and pomace from the seed-washer would from thence be conveyed into the stream and pass away, or the pomace might be collected and used for compost. The expense of erecting and equipping the model cider mill, would range from three to five thousand dollars, and with two men and a boy, would be capable of turning out, during the season, one hundred and fifty barrels of cider daily, and forty barrels of vinegar, besides washing ten bushels of seed. A suitable kiln for drying the seed over a moderate fire, would find its place in the basement room. Also the necessary filters for refining, and the conveniences for barreling, or bottling the cider or champagne. The manual labor necessary would only consist in laying the curbs, and removing the cheese, after the pressing had been completed, and also supplying the seed-washer from the vinegar press. The apples, having been placed in hopper bottom apartments in the fruit room, would supply the graters by a self-feeding process. Thus model cider mills could be erected in various fruit raising localities, and orchardists, for every ten bushels of apples furnished, would receive in return a given quantity of cider or champagne, by paying a stipulated price for the manufacture, thereby realizing at least double the net income that could be obtained from barrelling and selling the apples, and also, encourage the production of better fruits; for the better the quality of the fruit furnished, the finer quality of cider or wine would they receive in return. While the profits to the proprietors of the model cider mill would necessarily prove highly remunerative each successive season.

THE PORTABLE POWER WINE AND CIDER MILL.

A description of this mill, will close the subject of this chapter. It is constructed with a frame work, occupying a space of about six feet square, securely bolted and braced with iron rods, and is designed to be transported from one neighborhood to another upon a wagon, its aggregate weight being about eight hundred pounds. It may be operated by horse or any machine power, and can be used in any building, shed or orchard. It contains a grater, which feeds the pomace to the press curb, of which there are two, also two presses, with one screw to each, and both operated with the same power that may be used to grind the fruit. It is capable of manufacturing twenty-five barrels of wine or cider daily. The press beam and nut are made of cast iron, and securely braced, possessing great strength and solidity. The curb frames are square and firmly locked together. Cloths and frames are used as previously described in laying the cheese, and where preferred, the pomace frames may be enclosed in a bag, or sack, made for the purpose; which greatly facilitates the labor in handling them, and besides, saves considerable time in laying the cheese. The platform of the press frames, are encompassed with proper conduits for the transfer of the wine or cider to a strainer and vat, from thence into the barrel or cask. This mill is not as economical as the larger cider or wine mills, for the reason, that it performs its work hurriedly, and changing from place to place, has not usually the conveniences of water for seed washing, and cannot be retained ordinarily, a sufficient length of time at one place for manufacturing and expressing the material from the pomace for vinegar purposes. When used as a stationary mill, it has the advantage of cheapness, being comparatively inexpensive, and is capable of performing daily as much work with the united services of two men, as most larger and more expensive cider mills, and in all respects with much greater economy. It was invented in the fall of 1868, and its principal points are secured by Letters Patent.

CHAPTER III.

Cider from the apple.—Selection of fruit; treatment of same before grinding.—How to increase the color of cider.—How to make white cider.—Fallacies exposed.—General rules for making cider.—Different modes of manufacture explained.—Manner of testing cider.—Newark, (N. J.,) cider;—Crab apple cider.—Devonshire cider.—W. O. Hickock's plan for making cider.

This chapter, as indicated by its title, will be devoted exclusively to cider and the various modes of its manufacture, treating it as a crude article, and reserving the adjuncts or results derivable from it, as refined cider, wine, champagne and vinegar, for the subiect of subsequent chapters.

In reference to the apple, and the necessary machinery to produce cider, in an economical manner, particularly in a business supposed to be so well understood as cider making; there would appear to be but little which might with propriety be given in this connection. But while we make no pretensions to superior knowledge in this respect; we, nevertheless, cannot rid ourselves of the impression, that there is great ignorance prevailing in relation to this important branch of business, and perhaps science, as we sometimes, are led to believe, that cider making may be properly called.

We have therefore thought it expedient, in view of a prevailing anxiety, to ascertain the true processes of refining cider, and the mode of manufacturing wine or champagne from the juice of the apple, and also, in view of the general want of information on the subject, to present a few practical suggestions, with the hope that they may awaken such a spirit of enquiry and investigation, as will lead to establishling fixed principles in relation to the preparation of the crude article, and that its subsequent treatment may not be wholly lost. This point has been regarded as of little importance by many, under the impression perhaps, that cider making at best, was a small affair,—that to produce it, required no skill—that it was productive of no particular profit —and also that it was a subject which had been exhausted by our forefathers; therefore any deviation from the practice adopted by them in its manufacture would be erroneous, and lastly the whole business, was unworthy of any one's particular attention.

To counteract such erroneous impressions, is another object for presenting the following facts:

Cider, from the apple, is an article in its crude condition, which cannot possibly be uniform in the nature of things; that it all cannot after undergoing a certain process be made uniform, we do not pretend to deny. The reason why, as a crude article it is not, or cannot be made uniform in quality, taste or body, arises from the great diversity of soil and climate, where the apples are produced. There are besides almost endless varieties of apples, possessing taste and flavor with a range as wide as the localities vary. It is well known that the taste and flavor of the same species of apple are found to be different upon comparison, when produced in Michigan and Massachusetts, showing that the apple partakes more or less of the nature of the soil and climate producing it. A mineral analysis of the wood and bark of the tree in different localities, would indicate the character of the soil upon which it grew. Consequently, the great variety of taste and flavor found in apples, will, as cider is ordinarily made, be found in the cider corresponding with the fruit which produced it. This fact demonstrated by experiment, becomes one of the fixed principles, furnishing a basis, from which safe conclusions may be drawn as to the kind, quality and perfection of fruit necessary for the production of good cider, also clearly establishing that unripe and imperfect fruit should not under any circumstances be mixed with ripe sound apples. Whenever a good pure article of cider is to be obtained, the apples should be thoroughly ripe, otherwise the article produced, will be deficient in body and flavor; all hard apples are to be considered as imperfect, and the product of such fruit will be as insiped or as tasteless, as that obtained from green or unripe fruit. The exercise of great caution therefore is necessary, in the selection of the proper material, and in the next place, that it be properly cured before undergoing the process of manufacture. The better plan in all cases, is to pick the apples from the tree by hand, selecting only those which may be sound and ripe, leaving all unripe fruit upon the tree, in order to allow it to attain greater perfection, and be gathered at a second or third picking. Under no circumstances should apples be permitted to fall on the ground, as by laying there any length of time, they are liable to contract an earthy flavor, which will afterwards be found in the cider. Should they be shaken from the tree, coarse cloths or straw, should be placed under it, upon which the apples may fall. If the weather be fine, the fruit may be exposed in the open air, and if not, in sheds or lofts until it becomes thoroughly ripe. If placed in bins, it will undergo a sweating process, after which, it should be permitted to dry, before being ground for cider making. This sweating process, has a tendency to ripen the fruit, and make it uniform, thereby improving the flavor as well as the quality and strength of the cider, in consequence of the apples having parted with six or eight per cent. of water. The strongest cider is made from apples containing the smallest percentage of juice, and in its watery solution the largest proportion of saccharine matter. The color of cider may be materially varied by the management of the pulp, while its quality will be deteriorated in like proportion with the increase of its color. This fact may be thus explained: If an apple be broken, on exposing it to the atmosphere it will become brown, which is caused by the saccharine principle contained in the apple, taking up oxygen, thus causing it to undergo the same change as sugar does it a refinery when converted into molasses; and although molasses may not be called strictly an oxide of sugar, still it is sugar containing a larger amount of oxygen than is to be found in the crystalline portions. The difference between molasses and loaf sugar is not greater, than is the difference of flavor between the juice squeezed suddenly from an entire apple, and that taken from an apple previously ground and sometime exposed to the atmosphere. For certain purposes, as for the manufacture of champagne, light colored cider takes precedence. The juice, when pervading the pomace, is more exposed to the oxidizing influence of the atmosphere, than when separated from it. Different kinds of apples, give ciders differing in flavor, but from any kind, two distinct varieties may be made, the one, by expressing the juice before any color occurs, and the other, after the exposure of the pomace to the atmosphere before expressing the juice. If, instead of the ordinary presses, requiring the apples to be ground to a pulp, to facilitate the expression of the juice, some other device should be used and so constructed as to squeeze each apple separately, discarding the pomace of each as expressed, the juice would be of a perfectly white color. No particular oxidation would necessarily ensue, although during fermentation the intestinal motion of the mass would cause the vegetable proximates contained in the cider to come in contact with the atmosphere, thereby giving it both the flavor and color of cider, but not to so great an extent as when the apple is first ground to a pomace, producing, therefore, a quality entirely superior to cider made by the ordinary method. Some writers upon this subject, however, claim that the pulp should remain in a vat from twenty-four to forty-eight hours, or even longer, if the weather is cool, in order to heighten the color, and increase the saccharine principle; but they have neglected to inform us in what manner, the saccharine principle would be increased from laying in the pulp, any more than it would from laying exposed to the atmosphere, after the wooden fibre had been separated from it. Others claim "that the pulp should remain from twelve to twenty-four hours after the fruit is ground, for the purpose of allowing certain chemical changes to occur, when the juice will separate from the pomace," (which simply means fermentation,) "when the pomace will gather or contract, forming small recesses or channels through the entire mass, into which the pure juice will be thrown and thus escape, when allowed to do so, either from the vat or press." What is meant by pure juice, the writer omits to furnish any information; he leaves us to conjecture that, through the process of fermentation, the wooden fibre or vegetable proximates contained in the juice undergo a partial decomposition, which, being converted into a liquid, produces pure juice, and all that which was produced by breaking the cellular tissues of the apples held in a common mass, must necessarily be impure. This logic may answer where the apple has been imperfectly pulverized, or ground in an imperfect machine, and a partial decomposition must necessarily follow before pressing, in order to extract all of the cider from the apple. It is by the publication of such fallacies that erroneous impressions are created in the public mind, and the real object successfully concealed. Allusion has been made to this point, in chapter II, page 30, under the subject of Cider Mills, which fully explains this philosophy, if it deserves the dignity of so respectable a title. Again, this writer says: "If the juice or cider is expressed immediately after the fruit is ground, it will hold in solution and carry with it a large quantity of lees or sediment, which will act as a yeast, and produce a vinous fermentation, so rapid as to pass into an acetous fermentation, when vinegar is the result;" while he says: "A vinous fermentation is a mild movement, throwing the sediment down to the bottom, causing chemical action, giving life or effervescence; but if there is too much precipitant or sediment, it will cause reaction, when acetic fermentation will commence, and all is acid, rancid, sour, or vinegar." We have presented this, in order to show the vast quantity of logic and chemical knowledge which might be embraced in a few lines, (provided all felt willing to accept it as such,) but more particularly, to illustrate the kind and quality of scientific information that has heretofore been permitted to exercise its baneful influence upon the public mind. Doubtless the writer under consideration had, in common parlance, "an ax to grind," otherwise he might have stated whether all cider, immediately after pressing, contained a large quantity of vegetable matter, or otherwise, and if so, what course was necessary to adopt in the premises; but one thing he has revealed, perhaps unintentionally, which is, how to make vinegar rapidly, which, when actually undertaken in the manner suggested, might prove ineffectual.

McKenzie, in his work published in 1829, relating to "useful and domestic arts," making observations on cider, says: "To make good cider, the following general but *important* rules should be attended to. They demand but a little more trouble than the ordinary mode of collecting and mashing apples of all sorts, rotten and sound, sweet and sour, dirty and clean, from the tree and the soil, and the rest of the slovenly process usually employed; but in return they produce you a wholesome, high flavored, sound and palatable *liquor, that always commands an adequate price*, instead of a solution of "villainous compounds" in a poisonous and acid wash, that no man in his senses will drink. The finest cider I ever tasted was made of an equal portion of ripe, sound pippin and crab apples, *pared*, *cored*, and pressed, etc., with the utmost nicety. It was equal in flavor to any champagne that ever was made." Here is high authority, and what is more, his remarks embody a principle which, during the lapse of time intervening from the date of its publication to the present day, has not been changed, because it is a fixed principle, and is sustained by chemical laws and common sense. Ripe, sound fruit, is the only basis for a good article of cider, as he says in his general rules upon that subject, and furthermore, "pick the apples by hand. An active boy, with a bag slung over his shoulders, will soon clear a tree. Discard all apples that have lain any time on the soil, as they contract an earthy taste, which will always be found in the cider.

"After *sweating*, and before being ground, *wipe them dry*, and if any are found bruised or rotten, put them in a heap by themselves, for an inferior cider, to make vinegar.

"Always use hair cloths, instead of straw, to place between the layers of pomace; the straw, when heated, gives a disagreeable taste to the cider.

"As the cider runs from the press, let it pass through a hair sieve into a large open vessel, that will hold as much juice as can be expressed in one day. In a day, or sometimes less, the pomace will rise to the top, and in a short time grow very thick; when little white bubbles break through it, draw off the liquor by a spiggot, placed about three inches from the bottom, so that the lees may be left quietly behind. The cider must be drawn off into very clean, sweet casks, and closely watched. The moment the white bubbles before mentioned are perceived rising at the bunghole, rack it again. When the fermentation is completely at an end, fill up the cask with cider, in all respects like that already contained in it, and bung it up tight; previous to which a tumbler of *sweet oil* may be poured into the bunghole," which will exclude the oxygen of the air, and prevent it coming in contact with the surface of the cider as the cask may be gradually drawn off.

In the manufacture of cider, the rules before given embody all of the essential principles necessary to obtain a good article of the crude cider, for, notwithstanding the successive and repeated rackings, of which three are usually necessary, in order to separate the lees from the cider, and thereby prevent too rapid a fermentation on account of such sediment, there will be found sufficient of the vegetable proximates minutely associated with the liquid, to finally change it to acetic acid, unless prevented by a further treatment, which will be hereafter fully explained. Hence, under all the various modes of treating cider, as heretofore usually practiced, it cannot be regarded in any other light, at the best, than as a crude article, and imperfect, although it may be pleasant to the taste.

The usual mode of manufacturing cider, may be briefly described as follows: The ordinary cider mill, worked by horse or any convenient power, is supplied with a grating machine, which manipulates the apples into a pulp or pomace. This is then placed on a properly constructed press, by which the juice is extracted, which is then placed in barrels, and then in a cellar with an uniform temperature of about seventy degrees. After a few hours, an active saccharine fermentation will commence, which is usually permitted to continue, with the bung loose, until the hissing sound, so readily discernible when carbonic acid gas is escaping, shall cease. The cider is then racked or drawn off into clean barrels, separating it from its sediment, and again, after a few days, another fermentation of a short duration will take place, when it is again racked or drawn off as before, and the barrels tightly closed. Some of the larger manufacturers ferment in a chain of vats, placed at different elevations, so that the cider may be run by its gravity from one vat to the other during the process of racking, and be barreled from the lowest vat. If it be intended for bottling, this should be done early in the spring; the empirical rule is to do so before the appearance of apple blossoms.

The practice of cider making, in some sections of the country, where it is desired to obtain a dark, rich color in the cider, and also where they have the reputation of producing a good article, the rule has been to select none but sound, ripe apples, which are ground and thrown into shallow tanks, holding about seventy-five bushels. The pomace is then shoveled over once or twice, and allowed to commence fermentation, which occurs in six to forty-eight hours, depending on the weather, when the pomace is placed upon the press, using gunny cloth in laying up the cheese, instead of straw; about one-eighth of the first run is turned into the vinegar tank, and the same at the close. This is done under the supposition that by this means the heart of the cider is obtained, or the larger share of the saccharine matter, which is subsequently converted into alcohol, through fermentation, and therefore possessing more body, as being similar to the process of freezing to divest it of water, thereby retaining the alcoholic principle. The after treatment is similar to that before described. In this case the cider must be good, and far above the average, as it is made from selected fruit, with due regard to cleanliness; yet, by retaining all of the first pressing, with less anxiety to produce a rich color by the oxidation of the pomace, a still better article might be obtained, as a test, which to save, and which to reject, recourse should be had to the saccharometer, an instrument for testing the sweetness or sugar principle in liquids. If this test had been applied, it doubtless would have been found, under the process last described, that the average standard of that rejected was fully equal to that portion which was saved. As it not unfrequently happens, the first pressings will stand by that instrument at 24., and gradually running down to 17., at the last. Some cider makers place a higher estimate upon the last pressing of a cheese than upon any other portion, as they entertain the opinion it furnishes more of the saccharine principle; while the reverse is the fact, as is shown by the saccharometer. In the manufacture of the celebrated Newark (N. J.) cider, which commands nearly double the price of any other kind sold in the West Indian or Southern markets, small quantities of quinces are occasionally ground with the apples, which, in the estimation of some persons, improves its flavor. This cider is made from the celebrated Harrison and Canfield apples, before mentioned, in the first chapter of this work.

Another kind of cider is made, in various sections of the country, from the crab apple, which also has a high reputation on account of not requiring that care and attention in its final preparation, as most other kinds in the crude condition. It is slightly astringent, has a light color, and ordinarily keeps well; seldom or never becomes turbid, and, when bottled, holds its carbonic acid better than any other cider. When mixed with other cider, in the proportion of ten gallons to forty, it adds largely to the keeping qualities of the whole, besides, greatly improves the flavor. Much of the so-called crab apple cider is generally a mixture, in the proportion stated. The species known as the Virginia Crab, takes precedence for this purpose over all other kinds. Specimens of the crab apple cider, having attained the age of five or six years, may be found in various sections of the United States, and are said to be exceedingly fine, and are held at extravagant prices.

Another article of cider, known as the Devonshire, is made from a mixture of one-third of bitter sweet apples, with a mild sour. These being gathered when ripe, are allowed to undergo the sweating process before grinding; the cider is then pressed in the usual manner, strained through a hair sieve into hogsheads, where it remains for two or three days previous to fermenting. It is then drawn off into clean casks, to stop the fermentation, which, if it be very strong, but two or three gallons are first put in, and cotton or linen rags, saturated with brimstone, are burned in the cask, when the cider is then agitated, by which the fermentation of that quantity is completely stopped. The cask is then nearly filled, as this operation usually checks the fermentation of the whole, and in a few weeks the cider becomes very fine. If this be not satisfactorily accomplished by the first operation, it is repeated, until the fermentation be fully checked, and the cider is in a quiet state, and in a proper condition for drinking or bottling. We will conclude this chapter with the following practical suggestions, for which we invite a careful consideration:

Mr. W. O. Hickock, in his trade circular, recommends making cider substantially as follows, and says: "There are comparatively few persons who are aware how rich a drink it is when made pure, free from water, the taste of straw, and all the impurities that, under the old fashioned system of cider making, are incorporated into its composition.

"When pure and well made, it is doubtless far healthier than wine, and for liver complaints it is a sovereign remedy. On this account alone, the portable cider mills, that make cider without straw, are a benefit to the community; and when the farmer will take the same pains with his cider that the vine grower does with his wine, he will find an unlimited demand for it, at highly remunerative prices; and if the excise tax now imposed on whisky will turn the attention of the people to cider, it will confer an inestimable benefit. Pick all the apples, rejecting those not sound, and wash them clean, and afterwards let them lay and get dry. Grind and press them, using no water or straw, or any substance that will give the cider an unpleasant taste, as on the purity and cleanliness of the apples depends the quality of the cider. Strain the juice through a woolen or other close bag, put into clean barrels, and set in a moderately cool place, keeping the barrels full all the time, so that all the impurities may work off at the bung. After it has done working, rack it carefully off; let it stand a few days, and bung it up. As the air tends to sour the cider, it is a good plan to provide a bent tin tube, one end fastened in the bung, and the other to drop down in a bucket of water. This will let all the gas pass off, and not let the air get to the cider. The quicker the pomace is pressed after being ground, the lighter the color will be; and darker, if not pressed for twenty-four hours after being ground. Cider making should be conducted with all the care that wine making is. Most any good sour apples will make cider, but more generally an apple full of juice, and not very good to eat, will make the best. The Virginia crab, perhaps, excels all other apples for cider making.

"When bottled up, with a little rock candy, and wired, it will, after standing some time, sparkle like champagne when opened. To get cider very strong, expose it in a tub in extremely cold weather, and remove the ice that forms; as this can be only water, it leaves the cider of additional strength. Any substance put in to arrest the fermentation, is of doubtful value, as all good cider must be perfectly fermented, also carefully and cleanly made, to be healthy."

CHAPTER IV.

Fermentation; wnat articles necessary to produce it.—Grape Sugar.—Grape Sugar, how made.—Conversion of Starch into Sugar.—Vinous Fermentation.—When to arrest Fermentation.—Cider Brandy, how made.—Mother of Vinegar.—How to arrest Fermentation, &c.

When the juice of apples or other fruits containing sugar, is exposed to the air, a peculiar decomposition ensues, in which the sugar is resolved into carbonic acid gas and alcohol. A solution of pure sugar is not changed by exposure to the air; but if there is added to it a little yeast, or the juice of any fruit in the state of fermentation, decomposition takes place, and carbonic acid and alcohol are found. Many substances besides yeast will effect this change, as blood, albumen, or flour paste in a state of decomposition. It appears that the influence of a ferment depends on the condition, rather than on the kind, of matter. Any nitrogenized substance, capable of undergoing putrefaction, produces the same effect, and we are to attribute this change in the juice of fruits to a small portion of albuminous matter present. The mode in which these substances act is not fully understood by chemists, but it is supposed that when in a state of decomposition, they are able to induce a similar state in other substances, with which they are in contact; the equilibrium of the atoms in the compound is thus disturbed, and the elements arrange themselves in new forms.

It is interesting to know that the fermentation of sugar takes place only in immediate contact with the ferment, which may be readily shown by actual experiment. The act of fermentation is always accompanied by the appearance of a peculiar microscopic vegetation, which is formed when solutions containing albuminous matters are abandoned to putrefaction. The solution becomes turbid, and a gray deposit is gradually formed in it, consisting of ovoidal bodies,* variously grouped, whose development has been carefully studied under the microscope; the result found to be that the original globule, in about six hours, produces another like itself; the two again each germinate the third; and in like manner the germination proceeds until, in about three days, thirty globules are formed about the original cell. The development then ceases. The several globules are coherent, but appear to be distinct and complete in themselves.

The conversion of grape sugar into alcohol and carbonic acid, is very simple; one equivalent of dry grape sugar divides, so as to form four equivalents of alcohol, and four of carbonic acid gas, and, what is more singular, it is the only kind of sugar which is capable of this fermentation; although the others readily yield alcohol and carbonic acid, it is found that the first effect of the ferment is to transform them into grape sugar, by the assimilation of the elements of water.

Weak alcoholic liquors often become acid when exposed to the air, from oxidation of the alcohol and the formation of acetic acid; but this acid is sometimes directly formed from the decomposition of the sugar, independent of the action of the air, and is the cause of the souring of such wines as contain considerable sugar, but are very weak in alcohol.

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* One of the species appears to be much greater in size, with the vinous fermentation, while the acetic fermentation is characterized by a distinct fungus.

When a solution of starch is mixed with a little acid, or an infusion of malt, and gently heated, it becomes very fluid, and is changed into dextrine. When dextrine is boiled for some time with dilute sulphuric acid, it is converted into grape sugar. Many unripe fruits, as the apple, contain a large quantity of starch, but no sugar; after the fruit is fully grown, the starch gradually disappears, and in its place we find grape sugar. This change constitutes the ripening of fruits, and, as is well known, will take place after they are gathered. In this process we have clearly a conversion of the starch into sugar, by the agency of the vegetable acids present in the fruits. The vinous fermentation in the juice of the apple, and other fruits, in an infusion of malt, or in the syrup of the sugar cane, always results in the conversion of the sugar which it contains into alcohol and carbonic acid gas. When the fermentation is arrested before all of the sugar is decomposed, the wine is sweet; if the liquor is bottled before the action is finished, the excess of carbonic acid remains in solution, and gives an effervescent and sparkling property, as in bottled beer and champagne. When these fermented liquors are distilled, the alcohol, boiling at a lower temperature than water, passes out first. Thus cider brandy is made from the juice of the apple, and many other liquors, from various kinds of fruit, and grain.

Pure alcohol undergoes no change when exposed to the air alone; but if its vapor, mixed with air, is brought into contact with platinum-black, it slowly unites with oxygen to form aldehyde, which readily absorbs another portion of oxygen, and produces acetic acid. In the ordinary process for vinegar, alcoholic liquors, as wine and cider, are exposed to the air in open vessels. Although a mixture of pure alcohol and water does not absorb oxygen from the air, a small portion of any ferment, as vinegar, already formed, or the fungus plant before described, which is called *mother of vinegar*, enables it to combine with oxygen. In this process the essential thing is a free supply of air and a proper temperature. In the manufacture of vinegar on a large scale, this is secured by causing the liquor to trickle from threads of cotton drawn through holes, over shavings of beach wood previously soaked in vinegar, and contained in a large cask, with holes in its sides, so as to admit a free circulation of air; in this way a vast surface is exposed, and the absorption of oxygen is very rapid, causing an elevation of 20° or 30° in the temperature. The liquor is passed through this apparatus four or five times in the course of twenty-four hours, in which time the change of the alcohol into vinegar is generally complete. A full description of the mode of construction and this process, will be given in another chapter upon that subject.

The power of yeast to produce these organic changes, may be destroyed by boiling water, or by bringing the mass to a boiling heat, or by the addition of mineral acids or alkalies; also, by chloride of mercury, arsenious acid, salts of iron, zinc, oil of turpentine, or creosote.

CHAPTER V.

Substances used for Refining purposes.—Isinglass; Fish Sounds; Gelatine; Albumen; Casein; Bone Black; Clay; Silica; Sand, etc., with a description of Glycerine, and many of its uses.

Under this head may be described a class of substances which are common to plants, animals and minerals, and sustain a very important part in the process of refining cider, wine, vinegar, and other liquids. The peculiar properties of these substances consist in their ability, after having undergone a partial fermentation, to precipitate the impurities contained in and incorporated with any vegetable extracts in a liquid form, when mingled mechanically with it. Among the more prominent of this class, is the substance known as ISINGLASS, which is the dried air-bag, sound, or swimming bladder of fishes, and known to the ancients by the name of fish-glue. As this substance will constitute an important element in the further consideration of the refining process, we cannot do less than to furnish a full description of the various kinds and qualities known to commerce, as substantially given in Appleton's new Cyclopœdia. That various qualities of isinglass are found in commerce, may be accounted for from the fact that it is obtained from different fishes in various parts of the world. The best is found among the varieties imported from Russia, particularly that which is brought to St. Petersburg from Astrakhan, and said to be obtained from the sturgeon, called the beluga of the Caspian sea and the rivers which flow into it, a species which attains a length of twenty-five feet. According to some authorities, the sound is cut open, washed, and then exposed to the air, the inner silvery membrane outward. This membrane is then stripped off, placed in damp cloths, and kneaded with the hands. Taken out and dried, it forms the leaf isinglass; folded like sheets of paper, it is the book isinglass; wound in the form of a horse-shoe or lyre, around three pegs, it forms the varieties known as long or short staple. The isinglass called Samovey, is brought from Taganrog. The leaf, book, and short staple of this locality, are all of inferior quality; the varieties from the Ural and Siberia, are better. The Brazilian isinglass, imported from Para and Maranham, is obtained in various forms, distinguished as pipe, lump, and honey-comb. It appears to be the product of different kinds of fish, and to be prepared with little care. It is largely used in brewing establishments, for fining the liquors; and, though it is too impure for domestic uses, there is no doubt it is largely employed to adulterate the better articles. Its presence may be detected by the isinglass failing to dissolve readily and completely in hot water, and by its forming with this an opalescent and milky jelly, in which may be observed the insoluble shreds common to the Brazilian article; its smell, also, is often disagreeable, while that of the pure Russian isinglass is as inoffensive as the odor of sea weed, which it somewhat resembles. The isinglass of New York and New England is obtained from the sounds of the codfish, and of the common hake. They are macerated in water, and afterwards rolled out in long strips of a few inches in width. The quality of the isinglass is poor, its solution not readily obtained, and its color dark; it is used generally in brewing establishments, and on account of its usually being obtained at a lower price than the other varieties named, it is also largely used for refining cider and wine, and is, consequently, the article to which reference will hereafter be made.

GELATINE, in its purer form, is isinglass prepared for food, and also a jelly extracted from animal tissues by boiling them in water. When properly prepared, it is in colorless, transparent, thin sheets or shreds, of semi-horny texture, without taste or smell, varying in toughness according to the particular tissues from which it is prepared.

GLUE is the most impure form of gelatine, which is too well known to require any particular description as to its manner of preparation.

THE SERUM OF THE BLOOD AND THE WHITE OF EGGS contain in solution a large quantity of a proteine compound, which is similar in its character to dissolved fibrine; it is called ALBUMEN, and is nearly pure in the white of eggs.

MILK contains another soluble form of proteine, which is not coagulated by heat, but is at once separated in an insoluble condition by a dilute acid; it has received the name of casein, and is nearly pure in the curd of skimmed milk.

BONE-BLACK is an article made from bones, which are burned in close vessels at a red heat, and afterwards ground to powder. The valuable property possessed by bone-black is its absorbing completely the color of organic solutions, and leaving the liquid clear and limpid. Vegetable charcoal possesses the same property also, but in a much less degree. Besides extracting the color of fluids, animal charcoal takes away the bitter principle from bitter infusions, and iodine also from its solutions. Bone-black that has been once used for refining syrups, may be revived, so as to answer the same purpose again. The process consists in thoroughly washing out the saccharine matters absorbed, and, in some establishments, in dissolving the lime, which is also taken up in the bone-black, by long continued digestion in water acidulated with hydrochloric acid. The charcoal is then again calcined in crucibles. High steam is said also to restore its property, but this can not remove the lime.

CLAY is a great purifier, and is, therefore, included in the list of substances used in the refining process. It mixes easily with water in all proportions, and when diffused through a large body, it subsides very slowly. The purest kinds are those which are derived directly from the decomposition of the granitic rocks, which may be considered the original sources of the clays. These rocks are principally composed of three minerals, quartz, feldspar, and mica. While in some localities they are the most imperishable of all rocks, in others they are subject to decomposition to the depth of one hundred feet, or more, below the surface, without any immediate action of the weather, and while the whole mass may retain its appearance of solidity, it is nevertheless soft, and the disintegrated quartz may be extracted with a knife blade from the soft feldspar. As the surface waters flow over such materials, they convey them in part away, some mechanically suspended, and some in solution, and deposited, thereby forming clay beds. The feldspar from which the alumina—the principal element in clay—is wholly derived, is a silicate of alumina, united with a silicate of some base, which may be either potash, soda, lime, or magnesia, and a portion of the alumina may be replaced with an equivalent proportion of oxide of iron. These ingredients, in the decomposition of the mineral, react upon each other, and numerous compounds are produced. Silica, combined with alumina, and holding a definite proportion of water, is deposited, and constitutes the purest forms of clay, or kaolin. Such clays may be obtained in this country; an excellent material being found in the graphic granite of Brunswick, Maine, and also at Haddam, Connecticut. At each place it is a coarse mixture of very pure quartz and feldspar. At the latter locality it is being quarried to be broken up and converted into kaolin, for manufacturing white ware pottery, at Williamsburg, N. Y. A very good article of clay may be obtained at Milwaukee, Wisconsin, and in many other sections of the country. Clay, besides being used for the manufacture of bricks, buttons, artificial gems, alum, producing a gloss upon paper hangings, constructing adobe houses, fulling or scouring woolen cloths, and clarifying sugar by the process called claying, has also been found an excellent material for fining cider and wine. For this purpose, it should be thoroughly dried or baked, and then ground in a mill to a powder, and mixed with quartz sand, obtained from the sandstone beds of the same formation, in the proportion of one part of clay to four of sand. This sand, sometimes called SILICON, SILICA, SILEX, etc., is nearly a pure article, free from oxides of iron, lime, potash, soda, or magnesia, and upon that account is held in high repute for the purpose of preparing filters in the refining process. Silicon, combined with oxygen, forming silica, is abundantly distributed throughout the earth; it is said to form one-sixth part of the crust of the globe. When in a comparatively pure state, it is a nut brown powder, although in many sections where pure silex is found, it is nearly a clear white. A substance resembling silicon somewhat mixed with clay, yet difficult to determine in what proportions, without obtaining a full analysis, has been found in considerable quantities near Worcester, Massachusetts. This article has been somewhat extensively used, and found to answer most practical purposes, with fair results; while, it is said, a far superior article has recently been discovered in some sections of the State of New York, also in Michigan, Connecticut, and New Jersey. Doubtless many other localities will, as public attention is directed to the subject, be able to supply any existing demand, without the necessity of effecting humiliating compromises on the part of consumers, in order to obtain a requisite supply. The substance obtained from the vicinity of Worcester, Massachusetts, as shown under a powerful magnifying glass, contains silex, quartz, feldspar, and mica, possessing the principal characteristics of clay in its purest natural state.

A pure article of silex has, for a long time, been prepared by pulverizing the sandstone formation, and washing it at the same time in clear water, under the direction of a company, associated together for that purpose at Cheshire, Massachusetts. The silica, or silex, is nearly white, and, when in masses, resembles piles of snow. A very extensive business in this line has been carried on at Cheshire for several years past, for supplying glass works, and other establishments. Under the processes of kiln drying and bolting, they are enabled to supply all grades as to fineness, which, considering the pure quality of the article, renders it far superior, in the estimation of many refiners, to the brown article found at Worcester.

A coarser article of silica, or silex, slightly discolored, may be obtained at Savoy, Massachusetts. This article is well adapted for cider mills where filters are used, through which to run cider from the press, and also in preparing filters for vinegar. The finer qualities, to be obtained by bolting, will meet with a large sale, like the Cheshire silex, as soon as its peculiar fitness for fining purposes is known.

In the selection of material for filling leaches or filters, due regard should be given to the rejection of all kinds of sand containing iron, lime, soda, or magnesia, to any considerable extent. The effect of any of these articles would be to destroy the flavor and life of the cider or wine, by neutralizing the acid it contains, and at the same time to discolor the liquid. None but the purest and best articles should be selected, and then hickory wood ashes and small quantities of quick lime may be used in connection with them, under such circumstances as ordinarily require either or both of these substances, and thereby the operations may be fully understood and successfully controlled.

GLYCERINE, although not properly a substance used for refining purposes, may with propriety be considered under the head of substances connected with the refining process, and being so invaluable an article for many purposes necessary in the manufacture, treatment, and management of cider, a description of its various uses can not well be dispensed with. It is, as almost every one knows, a colorless, transparent, sweet syrup, without odor, inflammable, mixes freely with water, taking it from the air, is soluble in alcohol, but not in ether, and dissolves salts that are soluble in water; it does not become rancid by exposure, and with yeast may be made to ferment; scientifically, it appears to be a species of alcohol; popularly, it is the sweet principle of oil. It exists in oils and fats, but as it was not essential in the process of making soap and candles, and its valuable properties not being known until within a few years past, it had heretofore been either destroyed or allowed to flow away. It first came into use in medicine, being introduced into the ear when that organ was deficient in the secretion of wax. Its property of long continuing moist, while it is not of a greasy nature, has made it a popular substance in the arts. Its not being liable to putrefaction, renders it an excellent ingredient for soaps, pomades, hair tonics, photographic purposes, extracting perfumes from rose leaves, scented woods, etc., and for preserving the most delicate odors, it has no superior. It is employed to keep many articles of food from undergoing decomposition, and animal substances from decay; for this latter purpose it is substituted in place of alcohol. When tubs, pails, and barrels are saturated with it, they will not shrink and dry up, the hoops will not fall off, and there will be no necessity of keeping these articles soaked. After barrels have been cleansed and the inside saturated with glycerine, no fungus or mold will accumulate, and they may be kept sweet through the season; nothing better can be used to keep butter tubs fresh and sweet, and when thus treated they may be used several times in succession. When applied to leather used for machinery, such as belting, hinges, etc., also boots and shoes, it will keep them moist, and prevent any cracking or breaking. For lubricating purposes, it is also somewhat extensively used, as for delicate chronometers, clocks and watches. It is the best wash for the interior of molds in the casting of plaster figures, to prevent the gypsum from adhering to the sides of the mold. In the preparation of extracts and *liqueurs*, it is admirably adapted for preserving the characteristic flavors of those compounds, and as it is difficult to freeze it, even when mixed with its own bulk of water, and being a remarkably stable compound, and not a poisonous substance, it is peculiarly adapted to the preservation of wines and cider, to which use it has a legitimate application, and consequently, at the present time, a large quantity annually flows down the throats of a heretofore long suffering and much deceived wine drinking public, doubtless producing beneficial results in many cases, instead of passing away as formerly through the spout of the soap and candle maker.

The important discovery has recently been made that glycerine can be fermented into alcohol with chalk and cheese, and it may be possible hereafter to manufacture alcohol in this way. If so, the discovery may suggest some improved and cheap mode for the manufacture of acetic acid, or vinegar.

There are such a variety of experiments being conducted in the use of glycerine in the preparation of champagne wine from cider, and all with satisfactory results, (so far as known,) that it is at present difficult to furnish a particular description as to the best formula for its use. Each and every manufacturer entertains peculiar views of his own respecting this point, which relate, principally, to the quantity used to each gallon of cider; time of using it; that is, before or after refining, or at the time of bottling. The effect of glycerine upon the refined cider appears to be that of "ripening," and improving the flavor. When about a pound of glycerine is dissolved in five, ten, twenty, or forty gallons of the refined cider, and the same is allowed to stand for a length of time, securely corked, the difference in the effervescing qualities does not appear so apparent as it really is. But in this respect we feel assured that the proportions given in either case will be found quite satisfactory, provided the cask or bottles possess the requisite strength to withstand the pressure.

Glycerine, as an article of commerce, may be obtained at the principal druggist's establishments in this country, by the quantity, at prices ranging from sixty to ninety cents per pound, according to the quality.

CHAPTER VI.

Treatment of Cider.—Neutralizing, Checking, and Separating processes described —Horsford process.—Stumming process.—Alkali process.—Process with Alum Mustard Seed, etc., by Heating, Oiling.—Dr. Loomis' process.—Champagne Cider.—Racking off.—Fining by Gelatine, Fish Sounds, etc.—To prepare Finings.—Filtering process.—Construction of Filters.—Preparing Bone Black for Filters.—Description of Filters.—Plain Filters.—Double Filters.—Compound Filters, etc.

In considering the subject which relates to the treatment of cider, and the various modes usually practiced, we shall, as a matter of convenience, classify it into three divisions, namely: The neutralizing process, the destructive and checking process, and the separating process. Treatment of cider, under either of the first two divisions, cannot properly be called a refining process, while either may serve a temporary purpose, and accomplish a specific object, without obtaining in any sense the finer qualities of the cider; as such a result could only be secured through a purifying or refining process, after a proper fermentation in the cider had taken place, and allowing the liquid to ripen and become wine, by the attainment of sufficient age. The various processes before enumerated will be considered in the order named; consequently, the neutralizing process will first claim our attention. The object sought to be accomplished by neutralizing the fermenting principle, is to prevent too rapid a change in the organic elements of the liquid, in order that it may remain in its imperfect condition, partially developed—retaining the saccharine principle comparatively unchanged—or, in other words, from becoming sour. Among the several modes of preparation under this division of the subject, we cannot do better than describe the Horsford plan, so called from being first introduced by Professor Horsford, of Harvard University, which is substantially as follows: When the cider is in the barrel, going through a lively fermentation add as much white sugar as will be equal to half or three quarters of a pound to each gallon of cider, and let the fermentation proceed until the liquid attains the most agreeable taste; then add from an eighth to a quarter of an ounce of sulphite of lime to each gallon of cider in the cask, first mixing the powder in about a quart of the cider, then pouring it back into the cask, and giving it a thorough shaking or rolling. After standing bunged up a few days, to give time for the lime to become well incorporated with the cider, it may be bottled off, or used directly from the cask. The *sulphite* of lime must be used, and not the *sulphate*. The sulphite is a manufactured article, and is worth, by the barrel, from thirty to forty cents a pound. It will preserve the sweetness of cider, but unless care is taken not to use it too strong, the cider will taste a little of the sulphur.

The next mode of preparing cider, under the neutralizing process, is called stumming, which is accomplished by the introduction of sulphurous acid, the product of the combination of sulphur in oxygen, producing a colorless acid gas, with a pungent, suffocating odor, recognized as that of a burning match. A small quantity of water or cider, in casks where this gas is present, absorbs nearly fifty times its own volume of the gas; the volume being the same as that of the oxygen employed in producing it. Therefore, the proper mode of applying this neutralizer is, to pour two or three pailfuls of the liquor into a clean, strong, tight barrel, then fumigate; that is, have prepared a long, tapering bung, with a looped wire inserted in the small end of it. In the lower end fix strips of cotton or linen cloth, dipped in melted sulphur, sufficient to form a good sized match. Light it, and thrust it into the bunghole of the barrel; the match will burn until the oxygen in the barrel is exhausted. Then withdraw the match, put in a common bung, and agitate the contents of the cask by tipping the same backward and forward, so as to mix as far as possible the liquor and gas in the barrel. Fill up the cask, and bung it tight, and keep in a cool place until the cider is wanted for use. This process has been substantially given under the chapter on cider making, where it is called Devonshire cider.

Another manner of treating cider, to be described under the first division, is called the alkali method. This is accomplished by placing the cider in open tubs, and mixing one pint each of fresh slacked lime and dry, clean, hickory or other hard wood ashes, to every forty gallons of cider, first stirring the ashes and lime into one quart of new milk, and then placing the mixture into the tub and stirring it into the cider; this will cause all of the pomace to rise to the surface, from which it may be skimmed as it rises. Or, if the cider be placed in a cask or barrel, and treated in the same manner, it may, after remaining about ten hours, be racked off through a faucet near the bottom, and strained at the same time, if necessary. New cider from the press may be treated in this manner, or allowed to undergo a previous partial fermentation, until it has acquired the desired flavor or taste. The same results may be obtained by having the cider made late in the fall, and when made, by putting into each barrel, immediately, half a pound of ground mustard, and two ounces each of salt and pulverized chalk, first mixing these ingredients in a small quantity of the cider, then pouring the solution into the barrel. The whole should be agitated in a thorough manner by shaking, and afterwards stored in a cool place. The formula may be changed by using two ounces of mustard seed, two ounces of allspice, half a pint of sweet oil, and one pint of alcohol; mix the ingredients together, after which place the solution, in the proportion given, in each barrel, and agitate by a thorough shaking. These various modes have been highly recommended, while others claim if the cider be kept through the summer, that the barrels should first undergo the sulphuring process before described.

Another mode of preparing the crude cider, which may be used for medicinal purposes, is as follows: To each barrel of cider, just pressed from ripe sour apples, take one pound of unground mustard seed, one ounce each of pulverized alum and isinglass; put all into the barrel, leaving the bung out, and shake or stir once a day for four days. Then take one quart of new milk, and half a dozen of fresh eggs, beaten well together, and put them into the cider, stirring or shaking again as before, for two or three days. After allowing it to settle and become clear, draw off by a faucet, and, if intended to be used in place of wine, as a medicine, put it into bottles and cork tight; otherwise, for ordinary family use, place it in a clean, strong, tight cask, and keep in a cool place.

Various other modes for neutralizing the fermenting principle might be given, among which is the introduction of pulverized alum, about half a pound to the barrel, which should be done in November, and the cask securely bunged until the following summer, when the liquid may be used. Another way which has been recommended, is to place a pint of mustard seed in each barrel of cider, soon after it has been newly made, which, it is said, will keep the cider sweet for several months.

In the consideration of the second division of this subject, called "destructive," relating to checking or destroying the fermenting principle in cider, reference is had almost exclusively to the application of heat, although under the chapter on fermentation, mineral acids and alkalies have been suggested, their principal office, however, being to neutralize rather than destroy. For the purpose of checking fermentation, some kinds of oils have also been recommended.

In the application of heat, the plan usually adopted is, to place the liquid in a suitable vessel, after it has undergone the desired fermentation, and bring it to a scalding heat, carefully skimming off the impurities which arise, leaving the liquid clear, then bottling the same while hot; proper precaution, however, should be taken to prevent the bottles from cracking, by previously heating the same, which may be done by placing them in cold water, and bringing the water containing the bottles to a scalding heat. After bottling the cider, carefully cork, using only good, sound corks, previously soaked in warm water; as the cider cools, it will have the effect to retain the corks in the bottles without the aid of wire or twine. Cider thus prepared will keep for any length of time, and without any perceptible change. The treatment may be varied by scalding and skimming the cider previous to fermentation. Heat it until it boils; then take it from the fire and cool it; put it in casks, and close them air tight. Boiling one barrel down to half, and mixing it with another barrel which has been scalded and skimmed, thus making one and a half barrels of juice, is also a very good method; or boiling all down, so as to bring the cider to a standard of twenty or more degrees on the saccharometer, is also to be recommended.

The plan suggested by Professor L. C. Loomis, M. D., published in the U. S. Agricultural Report for 1862, may properly be given under the second division of this subject. Although not exactly destructive, it embodies the idea of checking fermentation. He says: Cider is deteriorated, both from want of care of the fruit, and from impurity of the cask. If the apples are permitted to remain until there is considerable decay, the taste of decay will be transmitted through all the fermentation of the juice. A pure, sweet taste can only be derived from sound fruit. Secondly, sufficient care is seldom used as to the cask; fresh liquor casks are the most desirable; a good mode of treatment for other casks, is the following: Soak for one or two days, then rinsing thoroughly, put in one or two buckets of water with a couple of tablespoonfuls of salæratus. Cork tight, and let it remain, with occasional shakings, for twenty-four hours; turn off the salæratus water, and fill immediately with cider. As the fermentation takes place, the object is to cork the cask tightly, as soon as the pressure will not endanger it; this is a nice point of observation with each barrel. If it be strongly iron-bound, it will bear closing much earlier, thus keeping the cider sweeter and more lively through its entire drawing. The preservation of cider in this condition consists in checking the first fermentation, by pressure, before it is fully complete, and thus preventing the second. The cask should be completely air tight, as any leakage will allow the change to proceed. If bottled at this stage, it will remain indefinitely, without change.

Another mode of checking fermentation, and said to be a very good way of preparing champagne cider, is to put three gallons of strained honey or twenty-four pounds of good white sugar into a cask containing one hundred gallons of good cider; stir them up well, and set it aside for a week. Clarify the cider with half a gallon of skimmed milk, or one quarter of a pound of isinglass or finely prepared gelatine, (Cox's is the best, being an imported preparation,) dissolved in hot water, and add four gallons of pure spirits. After two or three days, bottle the clear cider, and it will become sparkling.

The oiling process is another mode of checking fermentation, which consists in pouring into the bunghole of a barrel about half a pint of clear sperm oil, or, if preferred, the same quantity of sweet oil. The oil should be warm when poured in, to enable it to spread in a thin coat over the surface, and keep spreading as the cider is drawn down, thereby preventing the air from coming in contact with the surface of the cider, and converting it into acetic acid, or vinegar. We have long been familiar with this plan, particularly in storing cider in old oil casks; such casks impart no flavor to the cider, and will keep it sound as bottled cider for any desired length of time.

The third division of this subject, which relates to the various modes of refining by removing or separating the cider from the vegetable proximates, we regard as the most important portion of this chapter. By way of introduction, it may be necessary to state that there are three stages of fermentation to which cider is subject, viz., the vinous, the acetous, and the putrefactive. When cider has passed through the vinous fermentation, if left unchecked, it soon runs into acetous, and from this it quickly passes into the putrescent. After the vinous fermentation has taken place, and before the acetous fermentation commences, there will be remaining a sufficient quantity of the saccharine principle in the cider, if further fermentation be prevented, to keep the liquor sweet; this, with the carbonic acid held in combination, will give an effervescent and sparkling property to it; hence the grand secret in having a cider equal to pure wine, is to effectually prevent any further fermentation. Various modes have been practiced, with the view of accomplishing that object, many of which will be noticed, and, strange as it may appear, only one method has been discovered as yet, as will be seen, which has attained the desired result; all others being more or less defective. The first method to be described, is the common one of racking. After the cider has been properly made from fruit which has become thoroughly ripened, as previously described, and the barrels filled, they are immediately removed to a cool cellar, where they are allowed to stand with the bungs open until the sediment begins to go down; the barrels are then closed, and soon after the cider receives its first racking, (which is simply allowing it to run from a small hole bored about two inches from the chime,) and in running off leaves the sediment quietly behind. The cask in which the cider has been allowed to run is then placed upon a sufficient elevation, with the bung open, when, in the course of two or three days, it may be again racked. About three rackings, in the manner indicated, will be necessary to insure a reasonable certainty that most of the sediment contained in the cider has been removed. Then the barrels containing the cider (which should be full,) are closely bunged, to exclude the air; or, if it be intended for bottling, this should be done before the weather becomes warm enough for the trees to leave out and blossom. When bottled, the corks should be secured with wire or twine, and the bottles buried in the sand, with the corks up, in a cool cellar, or in some other dark, cool place.

This process has been long practiced in New Jersey, where the cider has a high reputation, being regarded by epicures as almost equal to champagne wine. It may be kept for a long period, and will also gain, apparently, in body.

The next plan to be described, consists in fining by the use of fish sounds, (isinglass,) or gelatine, blood, eggs, skimmed milk, etc. By this process, the cider should first be allowed to undergo a vinous fermentation, until the liquid reaches a standard of 13. by the saccharometer; this may be attained when the cider is made early in the season, by the addition of about half a pound of grape or other sugar for each gallon of the expressed juice, before fermentation. The sugar should be thoroughly dissolved in the cider, and fermentation allowed to proceed until the standard before given is reached; at this point place a quantity of gelatine in the cask, in the proportion of the contents of one box (about one quarter of a pound,) of Cox's prepared gelatine to one hundred gallons of the cider, the gelatine to be dissolved in half a gallon of warm water or hot cider, and the whole thoroughly agitated. After two or three days, the liquid will have become clear, when it should be carefully racked and the cider placed in clean, new casks, closely bunged, and laid aside until wanted for use. The mode of preparing the material for fining requires great attention, and therefore we have thought it advisable to give a detailed description of the proper manner of preparing each substance before mentioned. First, as to the ordinary fish sounds: Place about three pounds, previously pulverized, in about three gallons of good cider vinegar, in an open cask, stirring the mixture several times daily until thoroughly dissolved. In about four or five days, if the temperature of the room is kept at about 70° F., a strong fermentation will occur; sometimes a less period will accomplish the result, and under other circumstances a longer time may be required. As the mixture increases to about double the bulk, and before the fermentation ceases, put into the cask one gallon of pure spirits, which will check further fermentation and neutralize the acid of the vinegar; stir this mixture thoroughly, and reduce the mass by adding two or three pailfuls of the cider to be treated, and then pour into each forty gallon cask sufficient to settle the cider, whether it be half a gallon or more, at the same time agitating and thoroughly mixing the contents of the cask. After two or three days, when the liquid becomes clear, let it be carefully racked, as before directed. The pure spirits is a commercial article, and may be obtained from most ordinary druggists; it is prepared by redistillation and rectifying, is without taste or smell, being alcohol in fact, cleansed of the fusil oil, and consequently possesses no disagreeable odor; for the purpose recommended it is much to be preferred to ordinary alcohol. Instead of the pure spirits, new cider from the press may be substituted, which answers a very good purpose. Another way is to dissolve the fish sounds in warm water, which may be accomplished in a few hours; when fully dissolved, let the liquid cool, allow a fermentation to occur, and check it with pure spirits, afterwards reducing with cider. Blood may be used; bullock's blood is the best, but is not so readily obtained as the other substances. This should be allowed to undergo a partial fermentation in the cider, in the same manner as before indicated, then checked with pure spirits, and the mixture reduced. The whites of eggs should be treated in the same manner; some break the eggs and mix shells and contents all together; this is done for the neutralizing effect of the lime contained in the shells. Before the eggs (which should be fresh,) are placed in the tub for fermentation, they should be thoroughly beaten, so as to break the fibrin or albumen. Sometimes yeast is introduced in the finings, in order to hasten fermentation. Skimmed milk may be reduced and treated in a similar manner. It requires about two quarts of skimmed milk to each cask of forty gallons; some place the skimmed milk directly into each cask, and rack off the contents when the liquid has become clear. The same is done with blood and eggs, after having been previously thoroughly incorporated with a small quantity of cider. About one dozen eggs are ordinarily used for each forty gallon cask. While dissolving Cox's gelatine, it should be constantly stirred when over a fire, in order to prevent it adhering to the vessel at its bottom and sides, and to prevent burning or scorching. The manner of preparing most of the fining substances named, has been long supposed to be an important secret, and for this information many cider refiners have paid considerable sums of money. Notwithstanding the process described—which makes the cider very fine, and adds immensely to its keeping qualities, (the result being nearly pure,) and selling readily at prices which cannot but be highly remunerative—a large amount of impurities still remain in the cider, and when bottled will, after a time, be clearly seen in the form of a sediment at the bottom; this is recognizable in the finer qualities of many wines, after standing for some time in bottles, and said to be occasioned by means of suppressed fermentation. The explanation necessary to show why this is the case, may, perhaps, be given by stating that the finer particles of pomace or vegetable substances contained in the cider being so minute, their specific gravity alone is not sufficient to precipitate them until the flocculent particles immediately sustaining them are ultimately destroyed. Possibly, to these infinitesimal particles of the vegetable proximates may be properly attributed much of the unpleasant and disagreeable taste found in many kinds of wine and cider; the object of refining, therefore, is to cleanse and purify the liquid from all extraneous substances, of whatever kind or nature, leaving nothing in its solution but the pure juice of the apple. Each and every process before described fails in some important particular, and results in producing an impure article of wine or cider; therefore we have to describe the only method which has been found successfully to accomplish all that practical refiners have so long desired. This is known as the filtering process. The *Scientific American*, a paper which publishes many valuable things, some two or three years since described a very good plan for a filter, as regards the construction, but failed to state the objectionable features of the articles to be used; that is, the bone-black, charcoal and sand. The animal charcoal (bone black,) is a good article; the same may be said of charcoal and sand. The bone-black, however, before it is fit to be used, should be placed in a cask and thoroughly cleansed in a weak solution of chlorodydric acid, sometimes called hydrochloric acid, and known in commerce as muriatic acid. This treatment is necessary in order to purify them; the charcoal of its alkaline properties, such as lime and ashes, and the bone-black of the disagreeable odor pertaining to phosphorous. After these substances have been digested in the liquid for forty-eight hours, they should be taken out and perfectly cleansed in clear, running water, for twenty-four hours, and then dried. Ordinary sand, also, is apt to contain oxides of iron, or mixed more or less with potash, soda, lime or magnesia. This has a tendency to neutralize the acid of the cider, rendering it insipid to the taste, and destroying its peculiar properties; hence no kind of sand should be used which possesses these objectionable features. Assuming that all the substances recommended have been duly prepared, and the sand selected of a proper kind, we will proceed with a description of the aforesaid filter: "Take a square or round wooden box, made of inch pine plank, three feet in diameter, and one foot four inches deep; make it with a bottom perforated with numerous one-quarter inch auger holes, over which should be laid coarse hemp bagging; now fill in the box for eight inches with pieces of charcoal, (animal charcoal is the best, but is expensive,) about nut size, and on the top of this place a four-inch layer of clean washed sand, and cover all with a coarse hemp bagging, and you have a cheap and good filter. Any number of such filters may be used, according to the quantity of cider to be operated upon, and the tow cloth can be frequently washed, without disturbing the sand and charcoal. Before the cider is filtered through, pass a stream of clear water into the filter for fifteen minutes, so as to remove any fine, loose particles of charcoal, that otherwise would be mixed with the cider." While this would make a cheap filter, the materials recommended would be too coarse to make the filter effectual for removing the fine particles of pomace or vegetable matter contained in the cider. We have given a full description, in order to show the various defects. In the construction of a very cheap filter, instead of a box as described, take a barrel or forty gallon cask, remove one head, nail it together with two strips of board one inch wide, and perforate the head with numerous small holes, and place it inside of the cask, thereby making a false head; raise this up sufficiently to allow the liquid to run through and under it; set the cask on its head, affix a wooden faucet, use coarse cotton sheeting for cloths, and place in the finest pure sand to be obtained, to the depth of six inches, and coarse cloths on the top, tacked to the sides of the barrel or cask, or place stones thereon, so as to hold the cloths down, and the filter is complete. Before commencing to run the cider, put on water, and let it run until it becomes clear, then follow up with the cider. In establishments where the filtering of cider or wine is done systematically, it is prepared for that purpose by being first duly settled with finings. The cider should be made from ripe fruit, in the manner before described, using no unripe or green fruit, as fruit which has become ripened in a building and partially rotted, is much to be preferred to unripe fruit; it will make better wine or cider. The cider, as it runs from the press, should be strained and allowed to run into large tubs, the larger the better, even if sufficiently large to hold one hundred barrels of the extracted juice. When the tub has been nearly filled, it should be allowed to remain open at the top, and undergo the vinous fermentation.* All the heavier portions of the extraneous matter, pomace, etc., will settle to the bottom of the tub, and the lighter, flocculent matter will rise to the surface, forming a spongy, brown crust. As soon as the vinous fermentation has ended, cracks or fissures will appear in the crust, and the liquor, at this precise time, is clear and bright, or nearly so; the cider will appear strong and sour, and at this time the preparation of fish sounds, gelatine, or whatever finings may be used, duly prepared as has heretofore been described, should be placed immediately in the top of the tub, (after having skimmed off the light, flocculent matter,) and the liquor duly agitated at the top with a short stick as the finings are poured in; a cask of the dimensions stated would require a barrel of the prepared finings. In the course of twenty-four hours the liquid will become clear, when it should be drawn off above the sediment, and run into leaches or filters, prepared in the following manner:

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*The *Ohio Farmer*, publishes the following upon the subject of fermentation, and the quick ripening of wine, which is substantially the principle involved in the manufacture of vinegar by the tub generator process, described in another chapter.

"At a late meeting of the Cincinnati Wine Growers' Association, President Thompson read the following abstract of a new process of fermenting wine, which he regarded as extraordinary:

"'About a year since, Mr. R. d'Henruse, of California, patented a process of fermentation which has been tried in several vineyards and wine cellars, and has proved a complete success—so important that it ranks as one of the great discoveries of the age, eclipsing the new ideas of Liebig and Pasteur in agricultural chemistry.

"'The facts that fermentation depends entirely upon access to atmospheric air, and that the more intimate the contact with the air the more rapid the fermentation have been known for a long time; cider is converted into vinegar in a few hours by the process of dripping slowly through shavings, so that all the particles are exposed to the air.

"'It has been customary for thousands of years to let wine ferment in casks or vessels which were closed, except a small hole, and the sugar was never all converted into alcohol until after a year, and generally for wine it is considered indispensable not only to complete the fermentation, but also to clarify the wine and remove a certain harshness of taste. It must be racked off from cask to cask—requiring

DESCRIPTION OF FILTERS: For a plain filter, being the kind ordinarily used by refiners, construct of sound one and a quarter inch pine boards a box, or boxes, say three feet wide, ten feet long, and sixteen inches high; have the bottoms securely fastened by bolts and spikes, so as to prevent any leakage, and, if necessary, calk the joints with cotton. Place these boxes upon frames or platforms of suitable height, so that one end may be about two inches the lowest, and from which the liquor may be drawn through proper wooden faucets. Construct suitable conduits upon the inside bottom of the box, for conveying the cider to the faucet; then place half-inch boards, in pieces to form a false bottom, upon cross strips, which should be properly fastened to the inside of the box, about one foot apart, in such a manner as to provide for a space of at least two inches between the false bottom and the floor of the box or filter. This false bottom should be perforated with half-inch or inch holes; then take two pieces each of

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casks, storage, interest on money, skill and attention—making the management of a wine cellar expensive. Mr. d'Henruse ascertained that fermentation could be greatly hastened by forcing air into the wine, and that the clarification and removal of the ground taste, and other unpleasant flavors coincident with rawness, would keep pace with the fermentation.

"'The apparatus for introducing the air is very simple, consisting of a cheap air pump aud a perforated zinc pipe. The air rising through the wine in the cask makes a roaring like the rippling of a brook over a steep rocky bed. The air is applied cold. More than 100,000 gallons have been treated by this process the past year, and wine of the vintage of 1868, so treated, was shipped from California to New York in December last—while, fermented by the old process, it could not have been shipped till eighteen months old. The saving of time, labor, interest, and loss by evaporation, is estimated at 15 per cent., while the wine is greatly improved."

"Mr Thompson thought this a very valuable discovery, if all that is said of it be true. There are two fermentations, one in the fall, and another in the spring. In a 200 gallon cask of wine, he said that by the time it is ready for market, say a year and a half, the loss by the natural method of fermentation is about eighteen gallons, or nine per cent. By the proposed method of fermentation, it is completed at once, as is were, saving this loss.

common coarse cotton sheeting, one yard in width, and of sufficient length to cover the bottom and ends; sew or stitch these pieces together at the edges, and lay the cloth over the false bottom, and tack the sides and ends to the upper edges of the box. Place on the cloth the finest quality of pure silex (sand,) or silicon of the nut-brown color, to the depth of six inches, and spread evenly.

For a double filter, so called, the box over the false bottom and cloth may be filled first with three inches of the fine white silex, then a cloth, then four inches of the brown sand or silicon.

For a compound filter, place fine white silica or silex —such as has been mentioned in another portion of this work—and if it is found necessary to whiten the wine or cider, place in two inches of the sand, spread evenly over the surface, then lay over this sand another cloth of a yard in width, and place upon it one and a-half inches thick of prepared charcoal or bone-black, finely pulverized. Upon this lay another similar cloth, and place upon it one inch in thickness of pure clay, such as has been described. Over this lay another cloth, and upon this three inches of silex.

The filter will have a space of about six inches above the sand in either case. Then fill up with clean water, and let it run until the same runs clear; after which the cider or wine may be run through. The filter should be kept in constant operation as long as the liquid will run clear. Sometimes, if the cider be not properly settled, the leaches will become foul, from the fine particles of pomace, when the sand should be taken out, and the filtering materials replaced with a fresh supply. If bone-black be used, it may be cleansed, while with the sand it will be more difficult. The false bottoms should be taken up and thoroughly cleansed every time a new filter is laid; the cloths should be washed, boiled, and dried, and all nails and nail-heads protected so as not to oxidize, and thereby color the wine or cider. Such filters as have been described will each be capable of refining nine barrels daily. When the quantity to be refined is large, about a dozen filters should be prepared, so that at least half of them may be in constant use. The liquor from the leach should be permitted to run into large covered tuns or tubs, where it should remain until it undergoes a ripening process, which will greatly improve its quality and flavor. After the filtering process the air should be excluded, and, if kept over one or two seasons, it will become very fine by being stored in large casks in a cool, dry cellar. When cider has been properly prepared in this manner, it will possess a pleasant acid, agreeable taste, and will not undergo any fermentation if exposed to the hot sun of July or August, and may be safely transported any distance in bottles or barrels. It should never be put into any barrels except they be new, sweet, clean, sound, and tight. The product obtained under this process possesses a heavy body, and when treated in large quantities is of an uniform quality. Unless the fermentation has been properly conducted, the liquid may be too sweet or too sour, either of which will deteriorate the quality and value. If too sweet, and the vinous fermentation has not progressed sufficiently, it may be known when bottled from the circumstance of the bottles frequently breaking. If the vinous fermentation has been too strong, and not having reached the acetous fermentation, grape sugar or syrup made from grape sugar may be added, which will produce another fermentation, after which the liquid should be supplied with finings, and filtered as before described. Or the acid properties may be neutralized* before fining by employing hickory or other hard wood ashes, mixed with equal quantities of freshly slacked quick lime† in milk, and incorporating the solution with the liquor, in the ratio of one quart to every forty gallons so treated. Before doing this, however, the better way would be to test a small quantity of the cider, and thereby determine the actual amount required. The bone-black in the filter will absorb the lime, and no injurious effects will follow. For champagne wine purposes, the liquid may be reduced one third with distilled water, and adding to each bottle a small piece of rock candy, when the bottle should be filled, and securely corked, fastening the corks with wire or strong cord. After a short time the wine will sparkle and effervesce, in all respects like champagne. This manner of treating cider has been conducted with the utmost secrecy, by comparatively a very few persons, who are extremely reticent about the process, and consequently it has heretofore been comparatively unknown and little understood.

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* One pound of glycerine, used in the proportion named in chapter V, so as to acquire the desired taste and flavor, would be preferable, perhaps. These matters depend upon the result intended to be produced, as the results vary with the mode of treatment, and the judgment exercised in the operation.

† These ingredients are objectionable, for the reason that they tend to heighten the color of the product obtained. Some refiners aim to secure a dark color, which is consequent from the peculiar character of the sand, or the substances introduced during the process, and when the liquor is first prepared, it possesses a peculiar bitter taste, which passes away as the ripening process progresses.

At the Paris Exhibition, many samples of cider or apple wine were presented, which were made in England, Spain, France,* and the United States, and said to be a very good article. That made in the United States came from Indiana and Missouri, and was very fine. By which process it was treated, we cannot undertake to say; perhaps by the filtering last described.

CHAPTER VII.

Champagne Wine; where produced.—Champagne Cider.—Carbonic acid gas; how prepared.—Manner of injecting or charging Cider with carbonic acid.—Various processes of preparing Champagne Cider.—Professor King's process.—Professor Horsford's process.—Anonymous methods, etc.

The imported wine, called champagne, is prepared from the juices of various kinds of grapes, and among its peculiar properties is the quality of effervescing as it flows from the bottle or cask; hence the wine is sometimes called sparkling, or foaming wine.

This kind of wine was first made in the Champagne Department of France, but the name has been improperly given to other wines, made at other places, from their being good imitations of the genuine article, and possessing, in a large degree, this sparkling quality, which is derived from the presence of carbonic acid formed during the earlier slow fermentation, or artificially added after fermentation.

The manner of preparing champagne from the juice of the grape in France, may not be wholly uninteresting to cider refiners, and therefore a description of the process may be given, substantially as follows. In the first place, "the white and black varieties of grapes are cultivated indiscriminately in vineyards destined to furnish white wines, the mixture being deemed necessary for the perfection of this style of wines, especially those denominated sparkling. The healthiest and ripest grapes are selected, discarding all green, dry, and spoiled berries, and are carefully conveyed to the press, upon which they are gently laid, and the lever applied with as much celerity as possible. The extracted juice is then put into casks and placed in cellars of an equable temperature, until the first fermentation has taken place. In the month of March ensuing, after being fined and duly racked twice or three times, it is ready for bottling, previous to which the products of various localities are intermixed, for the purpose of obtaining the necessary qualities of aroma, or perfume, delicacy of taste, and strength of body. Hugh vats or tuns, prepared expressly for the purpose, are filled with the combination in the proportions determined upon, and after being thoroughly commingled and amalgamated, the liquid is allowed to settle, and is then drawn off into bottles, which are placed in racks so constructed that each bottle can be raised or lowered, so as to lie perfectly flat or stand almost perpendicular. Up to this moment the wines are rarely tampered with, by the introduction of either sugar or brandy, but in some seasons these substances are considered necessary for the purpose of producing a secondary fermentation, without which it is regarded as impossible to make the wines sparkle, or *mousser*. This process usually begins during the month of June, and continues the whole summer, pending which, especially when the grapes begin to ripen, or in stormy weather, immense loss is sustained by the bursting of the bottles, and the consequent escape of the liquor. After the lapse of eighteen months, during which the carbonic acid gas is generated by means of the suppressed fermentation, a thick, muddy deposit is precipitated to the neck of the bottle, which has gradually been raised to a standing position, and the wine becomes perfectly clear and limpid, having a very light straw color, and in this state it will remain for years. When required for exportation or for commerce, the sediment is carefully removed, *degorgie*, as it is termed, and a certain per centage of a liquor composed of fine rock candy dissolved and superior brandy, or an alcoholic distillation from the wine itself, is added to each bottle, which is strongly corked and secured by wire and twine, and the air excluded by covering the entire neck with tin foil or sealing wax. The amount of the liquor added to the wine varies from eight to twenty per cent. The soil which produces this wine is composed in a great measure of chalk and lime formation, and is exceedingly stony. The choicest vineyards are invariably those having a south-eastern or south-western exposure. The wines of Champagne are divided into three qualities; the sparkling, or *mousseux*, is the most popular, being of a highly effervescent character; the creaming, or *cremant*, which is considered the best by *connoisseurs;* and the still, or sillery, which resembles somewhat the white wines of Medoc. This beverage, although factitious, holds a higher place in popular regard than any other, and is justly esteemed by the amateur, the physician, and the refined epicure; its sparkling qualities and agreeable sweetness attracting the first; its diuretic and strengthening properties rendering it valuable to the second; and its full flavor, delightful aroma, and refreshing bouquet, endearing it to the third."

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* The production of cider in France is very large, and amounts to about two hundred and seventy-five millions of gallons per annum.

From this it will be seen, that there appears to be something in pure champagne which cannot be furnished by any other wine, no matter how manipulated. Hence surrogates, or wines made from apples, pears, currants, and other fruits, may be quite successfully manufactured, and the result appear in the shape of a good imitation of the genuine article; still certain features will be found to exist in wine made from such fruits as to betray the character of their origin and manufacture, particularly to those having experience in such matters.

Sparkling wines are growing in public favor, and becoming decidedly popular. When properly prepared, they only contain at most some five or six per cent. of alcohol, and have a tendency to slightly intoxicate through their alcohol and carbonic acid combined, but the intoxication is peculiar in its effects, as is well known, and it passes off quickly. The effect of such intoxication is mostly attributable to the carbonic acid gas present. Good sparkling wine will, of itself, as soon as the string or wire is cut, pop out the cork, and the foaming will follow immediately.

In the previous chapter, we described how cider wine may be prepared from the filtered liquor, to sparkle like champagne, and which is known in commerce as Champagne Cider. In order to give it still greater sparkling qualities, the refined cider treated under the filtering process, is first reduced about one-third with distilled water, so as to retain about six or seven per cent. of alcohol, and the solution charged with carbonic acid gas as it is forced into the bottle by means of a suitably constructed apparatus, (whereby the gas may be properly washed), similar to the soda fountains used by apothecaries. The bottle is then immediately corked tight, before any effervescence occurs, previous to which, however, a small piece of rock candy is sometimes added to each bottle. The carbonic acid is readily absorbed by the liquid, and gives it a pungent, pleasant, slightly acid taste, and adds largely to the keeping qualities of the wine or cider. The gas ordinarily used for this purpose is obtained from powdered carbonate of lime or limestone, exposed to the action of hydrochloric or sulphuric acid. It is generated in strong metallic vessels, capable of sustaining a pressure of four or five atmospheres, or more. Great care should be exercised in its preparation, as it is liable to convert many mineral substances with which it comes in contact into carbonates, some of which are soluble, and possess poisonous qualities. Copper gas generators, used for this purpose, should especially be protected by a lining of tin, glass, or porcelain, and the use of leaden pipes and vessels should be avoided. The usual method of impregnating the prepared liquid is substantially as follows: The gas derived from the action of sulphuric acid upon pulverized limestone, or powdered carbonate of lime, passes, under its own pressure, from the confined vessel called the generator, into an adjoining one called the reservoir or fountain, which usually holds about eighteen gallons, and is about three-fourths filled with the liquid. When fully charged with gas, it is disconnected from the generator, and from thence through a pipe regulated with a proper stop-cock, or by means of an apparatus specially constructed for the purpose, may be introduced into bottles and the same tightly corked, and thus be transported to any place and kept for use. A large quantity of cider is annually thus prepared, which finds a ready market, and is sold as champagne; it is much better than many manipulated wines, possessing no poisonous drugs, and besides, makes a healthy, invigorating, and pleasant drink.

There are various other processes for preparing an article called champagne from cider, none of which, however, can be recommended as equal to the one last described. One process is to add three pounds of sugar to each gallon of clarified cider, letting it stand three months to ferment. When bottled, add to each a small lump of sugar, which will excite a new fermentation. Wire down the corks, and in a short time it will be fit for use, as sparkling cider champagne.

Professor King recommends a process, which is, to take twenty-eight gallons of good cider, one gallon of fourth proof brandy, five gallons of genuine champagne wine, one pint of new milk, and half a pound of bitartrate of potassia; mix all together, and after standing for a time, it will ferment, when it should be bottled, and the corks securely fastened with wire.

Professor Horsford suggests the following mode of preparing cider wine: Allow new cider, from ripe, sound, sour apples, to ferment from one to three weeks, as the weather may be warm or cool. When it has attained to a lively fermentation, add to each gallon, according to its acidity, from half a pound to two pounds of crushed white sugar, and let the whole ferment until it possesses precisely the taste which it is desired should be permanent. In this condition, pour out a quart of the cider, and add for each gallon one quarter of an ounce of *sulphite of lime*, not sulphate. Stir the powder and cider until intimately mixed, and return the emulsion to the fermenting liquid. Agitate briskly and thoroughly for a few moments, and then let the cider settle; fermentation will cease at once. When, after a few days, the cider has become clear, draw off carefully, to avoid the sediment, and bottle. If loosely corked, which is better, it will become a sparkling cider wine, and may be kept indefinitely long.

The following process for making wine from apples, has also been highly commended: Take fifteen gallons of pure cider, made from sound, ripe apples, as it runs from the press, to which add sixty pounds of common brown sugar, and let it dissolve. Then put the mixture into a clean barrel, and fill the same to within two gallons of being full with clean cider. Put the cask in a cool place, leaving the bung out for forty-eight hours; then put in the bung with a small vent, until fermentation wholly ceases, and bung up tight; in one year the wine will be fit for use. This wine requires no racking; the longer it stands upon the lees, the better it becomes. Wine from currants can be made in precisely the same manner.

Another process for making apple wine, is to add two pounds of common loaf sugar to every gallon of apple juice, immediately as it comes from the press, and then boil it as long as any scum rises; strain it through a fine seive, and let it cool; add some good yeast, and stir it well. Then allow it to ferment for two or three weeks, until the accumulated crust begins to flatten, which should then be skimmed, and the liquid drawn off into a clean, tight cask. After standing a year, rack it off, and fine with isinglass. Then add a pint of pure spirits for every eight gallons the cask contains, or in that ratio.

With the following general observations on the manipulation of wines, we conclude the subject of this chapter: The manufacturer of imitation wines, such as may be produced from the juice of the apple, should at all times bear in mind the general principle that wine produced from any kind of fruit, as well as all liquors distilled from such fruits, have a distinctive character, which is recognizable by the peculiar taste and aroma of the fruit which produced it. Brandy distilled from the juice of apples, peaches, pears, cherries, and other fruits, only differ from each other, and from grape or wine brandy, by their peculiar volatile oils, which they contain in a very small quantity. So with champagne wine made from grapes, and champagne wine made from the juice of apples, the distinctive character is plain, and, the wine produced from either apples or grapes, without any attempt to disguise and substitute the product of the cheaper material in the place of the more expensive, will each, doubtless, find its advocates, as well as a ready market at such prices as cannot be otherwise than highly satisfactory. The question of the purity of the wine or champagne made from cider cannot well arise, particularly when the manner of its preparation shall have become generally understood. If any ingredients are mixed with the refined cider, the manufacturer should understand fully why he uses them, and what results will follow from such use. Where sugar is introduced during the process of refining, or at the time of bottling, the natural conclusion follows that the liquid is deficient in saccharine matter, in alcohol or carbonic acid, or that a secondary fermentation is intended to be produced. Where alcohol or pure spirits is mixed with the juice of the apple, after having undergone the process of refining, the inference follows that the liquid is weak in alcohol but has an excess of sugar, while the alcohol may be necessary to increase the strength of the liquid, preparatory to its being artificially charged with carbonic acid gas. As the alcohol or sugar adds no distinctive flavor of the grape, so essential in all sparkling grape wines, consequently the refined cider, before the imitation can be fully perfected, must be supplied with this requisite ingredient. The acid generally used in the manipulation of the juices of many fruits, is the tartaric, which supplies, at many times, an important element. Brandy distilled from the juice of the grape, when it can be obtained pure, greatly improves the flavor of the wine. As it is at most times difficult to obtain a pure article of Cognac brandy, the better plan is to substitute the article known in commerce as pure spirits, and use for flavoring, the oil of Cognac, a volatile oil obtained from the husk of the grape. The essential oil thus obtained, when distilled from the husk alone, is so powerful that a few drops of it are sufficient to taint or flavor a large cask of spirits. Where sugar is to be introduced into the cask or bottle, after the process of refining, let it be in the form of a syrup or rock candy; this would dispense with the necessity of removing the sediment precipitated from impure sugar in the cask or bottle, through a suppressed fermentation. By reducing the refined cider with distilled water, not only is a lighter body secured, but also the impurities contained in the water before such distillation are disposed of, and are not found as a sediment in the bottom of the cask or bottle.

The ripening process should be carried on in large casks or tubs, and the liquid fully protected from the air. The addition of glycerine will give the wine the appearance of age. We shall not attempt to furnish any precise formula for the preparation of compounds, intended to represent, by imitation, the genuine article of champagne; as we believe the assurance may be given that nothing will be found, all things considered, of so stable a character as the pure, unadulterated cider champagne, or cider wine, before described in these pages.

CHAPTER VIII.

Vinegar; sources of, and how produced.—General History of its manufacture.—Alcohol, Malt, Sugar, and Cider Vinegar.—Vinegar from Apple pomace.—From imperfect Apples.—The quick process.—Generators; how constructed.—Materials or substances used in filling Generators.—Modifications in the construction of Generators.—Patent Generators.—Tub Generator.—Improvement thereon.—Forcing heated air through the Vinegar fluid.—Character of the Vinegar fluid.—Its Alcoholic strength.—The acetic strength of Vinegar.—Limits of temperature.—Process of coloring.—Character of water to be used in Vinegar process.—Ferments and properties of.—How to preserve Vinegar.—Imitation Vinegar; of what composed; how manipulated.—Various processes of manufacture for merchants, grocers, and families.—Instantaneous Vinegar.—Pres't Nelson's and other plans relating to Cider making for Vinegar, etc.

In the manufacture of vinegar, a proper regard has to be given to the subject of fermentation, which has been fully explained in a previous chapter. The conversion of apple juice into vinegar, implies the necessity of two fermentations, to wit, the vinous and acetous. The vinous becomes necessary, in order that the saccharine matter contained in the cider may be converted into alcohol, while the latter, uniting with the oxygen of the air, through an acetous fermentation is converted into acetic acid. This acid, in the common form of vinegar, has been known from the remotest times, and furnishes the peculiar properties attributed to that liquid. It may be produced from many vegetable and animal juices, and is naturally found in some plants. Again, it may be obtained in the product of distillation of woody matters, without their undergoing the fermenting process. All substances, therefore, that can undergo the vinous fermentation and produce alcohol, are fit for the manufacture of vinegar. While the effect of fermentation is, in general, to break up existing compounds, and form others less complex, the acetic fermentation, it is said, is an exception, and the only one, as the result of that action is found in a more complicated compound. Vegetable matters in liquids undergo the acetic fermentation, only when alcohol is present and air is admitted; and as this fermentation depends on the presence of alcohol, a vinous fermentation must precede it, to convert the saccharine matters into alcohol, as before stated. A warm temperature is an essential requisite for an acetic fermentation, and this is increased by the heat evolved in the chemical action. When all of the alcohol is consumed or converted into acetic acid, the process is complete.

The varieties of vinegar manufactured from wine, alcohol, beer or malt, sugar, cider, etc., differ according to the nature of the substance employed in their manufacture. Although of the same chemical composition, they possess quite different flavors, as vinegar made from wine retains some tartaric acid and acetic ether, which gives to it its agreeable aroma. The usual process for making wine vinegar, is to add good wine to a cask already partly filled with vinegar, to which air is admitted, and when this is converted into acid, more wine is added, and so on until the cask is filled with acid. A quantity is then drawn off, equal to the wine added, and the process is repeated. If the temperature of the room where it is manufactured exceeds 84°, there is danger that a portion of the alcohol, when in the state of aldehyde, or half converted into vinegar, will be lost by evaporation, and the liquor be deprived of so much of its strength. At a much lower temperature the process goes on too slowly. The quick method of manufacture consists in the use of two casks, set on end, one quite filled with alcoholic liquor and the stalks and husks of grapes, or beech wood shavings, and the other half filled with the same. Every twelve hours, half of the liquor from the full cask is poured into the other one, and in this the acetifying process goes on with rapidity and the evolution of much heat. In a still more perfect arrangement, the vinegar mixture is made to filter slowly through beech wood shavings, which have been prepared by scalding them repeatedly with hot water, to dissolve out all soluble matters; these are placed in the cask till they fill it two-thirds full; the vinegar mixture is made to drip down little threads, which are placed through numerous holes in a false head, by which it is distributed through all the shavings. Air is admitted by holes made through the staves around the lower part of the cask, and circulates among the shavings, passing out at the top of the cask, through tubes which penetrate the false head. The mixture used consists of twenty quarts of alcohol, forty quarts of vinegar, and one hundred and twenty quarts of water, or fifteen and one-half quarts of alcohol, twenty quarts of vinegar, and one hundred and thirty-seven quarts of water. The water is heated to 100°, or 104°, then the vinegar and alcohol are added. This mixture is poured on at the rate of three to five quarts every half hour. It is drawn off at the bottom, more alcohol added, and returned to the cask, and so on till the vinegar is very strong. The process may be completed in three days, but usually requires a longer time. By adding all the alcohol at once, there is risk that some of it will not be acidified; this may happen from want of sufficient air, or from too great heat, which causes the aldehyde to evaporate.

Malt vinegar is extensively made in Great Britain. This is prepared by extracting the saccharine matter of the malt, made from barley, by steeping in water; the liquor is pumped repeatedly into casks, in which are placed the stems and stalks of grapes, through which it filters. The process does not vary greatly from that previously described.

"Beer, ale, and porter, that have become sour and hard, are found to be quite unfit for the manufacture of good vinegars, and consequently are rejected in the best establishments. Beer vinegar contains the constituents of beer, as the phosphates of lime and magnesia, gum, and an extractive substance which gives it its color."

Sugar vinegar is made from sugar and water, and the addition of some kinds of fruit, as gooseberries, with yeast and raisins. It is conveniently made for the table, by dissolving three pounds of sugar in a gallon of water, covering it loosely with a cloth, and adding yeast, or, instead of yeast, the mother of vinegar; alcohol is formed, and this is soon converted into acetic acid.

Cider vinegar is the most common variety in this country, provided we except imitation vinegars, which will hereafter be described. The various modes of manufacturing cider vinegar will constitute the leading features of this chapter, together with a detailed description of the machinery and generators employed in the process of such manufacture.

VINEGAR FROM APPLE POMACE.—After the cider has been extracted, and the cheese removed from the press, the pomace may be placed in a pile, upon a suitably constructed platform, (as has been described in the plan for a model cider mill,) and allowed to ferment. In the course of a few days, considerable heat will be evolved; at this time a few pails of warm water (not boiling,) should be poured upon the pile, and in the course of twenty-four hours, the pomace will be in a proper condition to grind. It should then be run through the grater mill, and relaid upon the press in a cheese, in the same manner as originally laid in cider making, when it may be subjected to a heavy pressure until the liquid contained in the cheese be extracted. This liquid may then be exposed in shallow, open casks, in a warm room, and in a short time will be found to be good vinegar. Or, the liquid may be immediately passed through a generator, hereafter described, which will convert it into vinegar, without any particular delay. Another plan is to construct a leach, similar to those used for leaching wood ashes, only upon a much larger scale. This may be made in the shape of an inverted pyramid, or in any other form, only that it be constructed in such a manner as to provide means for carrying off the liquid at the bottom through suitable conduits. In this leach may be placed the pomace or cheese, after the cider has been extracted, to which pomace a few pails of warm soft water should be added. In about four or five days, an active fermentation will ensue, and as subsequent cheeses are placed upon the leach, they will also become heated as they undergo the fermenting process. A few pails of warm soft water should be mixed with the pomace of each cheese as it is placed in the leach. This plan of using the pomace and allowing the air to pass through as the fermentation progresses, constitutes a sort of a generator, which converts the liquid in the pomace into quite passable vinegar, which should be stored in suitable tubs. When the vinegar ceases to run, the contents of the leach may be removed, and the same refilled with fresh material from the presses of the cider mill.

VINEGAR FROM IMPERFECT APPLES.—The imperfect apples, which before and during ripening fall from the trees, (commonly called windfalls,) if gathered, crushed or grated, and the juice expressed, will make vinegar of the first quality, with but little expense besides that of manufacturing, which is trifling. The apples are ground and thrown into shallow vats, and allowed to ferment one, two, or three days, according to the weather, then pressed, and the liquid put into old vinegar casks, containing mother of vinegar. These casks, as soon as the weather becomes cool, are placed in a cellar or in some place which may be kept warm by means of a stove. When in the course of three or six months the whole product is converted into good strong vinegar, it is then racked off into new barrels for market; or, the process may be varied, and the juice of the apples allowed to pass through a vinous fermentation, when the liquid may be run through a generator, and immediately converted into vinegar; or, if such an apparatus be not at hand, it may be mixed in equal proportions with old vinegar. For this purpose a stock of old vinegar should be held, as the casks containing it may be used as generators, and thereby the acetous fermentation will be greatly accelerated.

The quick process of making vinegar, consists in exposing the vinegar fluid to the air at a certain temperature, and upon the largest surface. For this purpose generators have been devised, which accomplish the object sought, and at the same time control the temperature. These generators are simply tubs, slightly conical, with the upper diameter the largest. They are made of oak or white pine, and may be from six to twelve feet in height, and from three to four feet in diameter, or in that proportion. At from ten to fourteen inches above the bottom of the generator, six or eight, half-inch air-holes are bored, at a slightly descending angle, so that the vinegar fluid trickling down the inside of the tub may not escape through them; at the distance of a couple of inches above the air-holes, a false bottom, pierced with three-fourths of an inch or inch holes, is placed, to sustain the shavings, corn-cobs, charcoal, or whatever material may be used, through which the vinegar fluid may be allowed to drip. From six to eight inches below the top of the generator, a hoop, or, instead, three isolated cleats, are fastened with wooden nails or pins, for the purpose of supporting a horizontal partition, pierced with gimlet-holes of one-eighth of an inch in diameter; through this the vinegar fluid drips down into the chamber below, filled with shavings or other material. These holes are placed about one and one-half to two inches apart, in regular order; they should be bored, and then cleaned with a red hot iron of the proper size, to prevent their being closed by the swelling of the wood, from the action of the warm vinegar fluid. The joints or crevices between the partition and the walls of the generator, should be carefully calked with cotton or oakum. Besides the small holes in the partition, four larger holes are bored at equal distances apart, and midway between the center and circumference of the partition; they provide for the insertion of glass or wooden tubes, of three-fourths of an inch bore, and which reach to within an inch of the cover of the generator. These are chimneys, by which the draught of air escapes from the generator, and they must be fitted perfectly water-tight. Some prefer to the partition described, a shallow tub, fitting in the top of the generator, with the bottom pierced in the same manner. In either case, pieces of twine or candle-wick, about four or five inches in length, with a knot tied in the upper end, are drawn through the holes. These knots serve to keep the cords or wicks in their places, and to prevent the vinegar fluid from working out too fast, when the generator is in operation. Six inches below the bottom of the shallow tub or perforated partition, a hole is bored, at a descending angle, for the reception of a thermometer, the scale of which must be visible from 75° F., upward. The shallow tub or partition must be made so as not to warp, and must also be placed in a perfectly horizontal position. A cover must fit well upon the generator, and be made airtight. In the middle of the cover a hole is made, for the introduction of the vinegar fluid; it must be capable of being closed to a required degree, which will aid in regulating the quantity of air passing through the generator. It is a fixed principle in the operation of a vinegar generator, to suffer no more air to traverse it than what is just sufficient to effect the acetification, as otherwise more alcohol is lost by the evaporation. The generator contains, near the bottom, a large wooden faucet, for withdrawing its liquid contents; this faucet should be placed some six inches or more from the inside bottom of the generator, and below the air-holes, and left open, so that the liquid may flow from the generator when its level corresponds to the delivery of the faucet; the object of this arrangement being to keep constantly in the generator a large body of the warm acidified liquor, which utilizes the heat the liquor has acquired by the acetification, and thereby saves fuel. Near the bottom of the generator a second faucet should be placed, in order to draw off, when necessary, all of the vinegar. Various devices have been adopted for the introduction of air to the center of the generator tub. This may be accomplished by inserting in the air-holes long wooden or glass tubes, of uniform length, through which the air flows at a descending angle, and at the same time prevents the escape of vinegar. The generator should also be so placed as to permit the liquid contents to flow into the necessary barrels or tubs, and with sufficient room or space above, to facilitate delivering the vinegar fluid into the top of the generator; more space than is just sufficient is injurious, as it involves a waste of heat. It is not a good plan, especially in winter, to have tubs delivering the vinegar fluid in an upper story, as the upper portion of a room is the warmest, and heat may be saved by placing the tubs for delivering the vinegar fluid near the ceiling of the vinegar room. The vinegar fluid may be forced up by means of pumps of wood, through rubber hose.

As to materials for filling the chamber of the generator tub, beech wood shavings may be regarded as the best, while maple or basswood are valuable in the order named. In preparing these shavings, a heavy plane is fixed in a frame, having rebates attached to its sides, so as to render it capable of only a backward and forward motion. The floor of the frame is perforated with a longitudinal aperture, in which a beech wood board of a foot in length, one inch in thickness, and six to eight inches in breadth, may slip and present its edge to the plane iron, which cuts from it shavings one inch broad by a foot long; by means of a lever and weight, the beech board is pressed upward with the desired force to enable the plane to cut. Closely curled shavings are required, on account of their strength and porousness; the close curl prevents the lower layers in the generator from being crushed by the weight of the superior layers. To obtain a shaving of any required spiral, the plane is doubly ironed; as the sharp iron cuts the wood, the shaving is pushed over by the blunt iron, forming a close curl. With beech boards of the dimensions given, it will be seen that six shavings have the area of a square foot. The shavings may be cut in the usual manner from strips of board of about eighteen inches in length, by planing thick, heavy shavings from the edges; and if they do not roll up and stay in nice rolls, then they must be rolled by hand. and tied with a small cord. Clean corn-cobs will answer, but, as a general result, they will only last one season, whilst the shavings will last several seasons. Chips of beech wood, charcoal, and other porous bodies, may be used instead of the shavings.

In Germany, especially, the use of charcoal has been followed with great success; the coal is broken into pieces of the size of a walnut, sifted from dust, washed and dried. When saturated with vinegar, it acts precisely like beech shavings. The pores of the coal absorb from five to six times as much vinegar as beech shavings, which brings a greater amount of ferment in contact with the vinegar fluid. The air surface is not increased by this porosity, as the pores are filled with liquid. If corn-cobs are used, they must be put in layers, each layer crossing the other, to prevent their packing too close. The cobs should first be thoroughly soaked or washed in water, then dried, and afterwards boiled in strong vinegar. Shavings, and other materials, used for the same purpose, should be treated in a similar manner. This heating with vinegar, may be effected in a wooden tub, with a pipe delivering steam into it, or boiling the same in about twenty gallons of vinegar, in a perfectly clean cast-iron cauldron, and placing them at once in the new generator, and rejecting the first vinegar made.

The material may be filled in the chamber to within about six inches of the bottom of the shallow tub, or the perforated partition, and if not previously acidified, the same may be done, substantially as follows: the temperature of the apartment having been kept for a day or two previous, between 75° and 80° Fahrenheit, hot and strong vinegar is repeatedly poured into the aperture at the top of the generator, in such a manner as to be evenly distributed throughout the chamber. By this method, the vinegar extracts what soluble matter is left undissolved by the water employed in the soaking; and, in consequence, the first vinegar made is of inferior quality. As the generator begins to become well saturated with vinegar, a little alcohol may be added with the vinegar fluid; thus gradually working into the vinegar manufacture. At this juncture, it is well to close the opening in the cover of the generator for twelve or twenty-four hours; if, at the expiration of this time, the thermometer indicates a temperature of 95° to 100°, when placed at the opening in the cover, the apparatus is in a proper condition for proceeding with the manufacture. The main points to be observed in the management of the generator, are a free supply of air and an equable temperature; and, that to make good, strong vinegar, it is advisable to use three generators, under all circumstances. The vinegar fluid, as it passes through each in succession, has an addition of alcohol each time, and thereby the fluid is brought to a six per cent. alcohol standard. The advantages claimed under this practice are, that the alcohol is being gradually converted into vinegar, and prevents the formation and escape of aldehyde, as might be the case if the vinegar fluid were admitted in the first instance into the generator, and mixed at the full alcoholic standard. The gradual addition of alcohol in the vinegar fluid as it passes each successive generator, prevents the evaporation or waste of alcohol in the form of aldehyde, and secures a product of an uniform quality; besides, a great advantage is gained by keeping a body of warm vinegar in the generator, as it assists to regulate the temperature of the apparatus. By the use of three generators, the operation is uniform throughout, while if but one generator is used, the vinegar fluid might have to be passed three times through the same apparatus, receiving at each time its proper portion of alcohol, and virtually resulting in setting the generator in action afresh after each withdrawal of manufactured vinegar, producing at least irregularity of action and unequal temperature. The best test of a correct working, is found in the temperature of the air leaving the generator; it should be uniform, and in the neighborhood of 100°, F.; if the temperature falls much below this point, it indicates that the fermentation has ceased, when immediate steps should be taken for its restoration, by pouring on vinegar fluid heated to 100°, and letting the generator stand for a short time with its top ventilating hole closed. If, on the other hand, the escaping air possesses a higher temperature, the fermentive process is indeed quickened, but the vinegar is of inferior quality, is full of vinegar eels, and of inferior strength; for not only is alcohol lost by evaporation, but a portion of acetic acid is decomposed. Care should be taken that not too much air be given to the generator, as a large proportion of air acts injuriously. If the vinegar room be not very warm, its tendency is to cool the chamber of the generator, thereby retarding the fermentation, and not absorbing the oxygen of the air sufficiently.

Ordinarily, not more than one quarter of the oxygen is absorbed; the more successful manufacturers of vinegar, however, absorb a much larger proportion of oxygen from the air while it traverses the generator. The quantity of air needed for the process is ascertained by carefully watching it at the outset, and regulating the current by closing, to the requisite degree, the hole left for that purpose in the cover of the generator; too little air is indicated by aldehyde in the apartment, which will be recognized by its penetrating odor, and by its powerful effect upon the eyes. The quantity of air admitted to the generators should be just sufficient to prevent the formation of this aldehyde; the air current passing the chamber of the generator is in a measure self-regulating, because the more active the fermentive process, the warmer does the air in the generator become, and the more rapidly is it deprived of its oxygen. This draws a larger quantity of air through the apparatus, and as the air of the apartment is lower than 100°, the chamber of the generator becomes slightly cooled, and the activity of the fermentation proportionately retarded. If the vinegar fluid be excluded from the apparatus at night, the vent holes must be completely closed, to prevent too great cooling of the chamber of the generator.

There are many modifications in the construction of generators, from the one described, which relate to the distribution of the vinegar fluid, the admission of air, the use of material for filling the chamber, etc. But the principle of their construction and operation is the same in all cases. The object sought in every instance is to expose the fluid over the largest possible surface, in such a manner as to allow it to unite with the oxygen of the air, and, through the aid of a ferment, be converted in the shortest possible space of time into a weak acetic acid, or vinegar. Some manufacturers dispense altogether with the use of twine or wicking for drips, and leave the small holes open and unobstructed; the vinegar fluid runs in a steady flow from the tub in which it has been prepared, to a wooden bowl placed in the centre of the upper perforated partition, and from thence is allowed to run through small conduits or pipes, arranged in such a manner as to distribute the fluid equally over the surface of the perforated sieve or partition. This apparatus is called a distributer,* which answers a very good purpose. In relation to the admission of air into the apparatus, some adopt the plan of admitting it through one pipe, which is fitted water-tight in the center of the bottom of the generator, through which the air passes to the centre of the tub, to within two inches of the lower perforated partition. This is covered with a cap, slightly elevated above the tube, and serves the double purpose of distributing the air and preventing the vinegar from flowing through the tube as it drips from the generating chamber. The generating chamber is also divided into several compartments, according to the height of the generator; the partitions are made of slats of wood, like lath, placed crossways and supported at proper intervals by scantling, with the ends resting upon uprights, fastened with wooden pins to the sides of the tub; these compartments are usually made about four feet high. The object to be attained is simply to prevent too great a weight upon the shavings or other material used in the apparatus, through which the air flows and the liquor permeates, or filters. These chambers may be filled with clean corn-cobs, washed, dried, and afterwards charged with vinegar acid, or strong vinegar, in the manner before described. Others again use, instead of corn-cobs, an article called coke, which may be obtained at gas works; it is a light, spongy material, being the residium from bituminous coal, such as is used in gas manufactories. This coke is broken into small particles, of about the size of a hazel-nut, and afterwards sifted, to remove all of the finer particles, and then immersed by means of a basket in a large tub, containing a dilute solution of muriatic acid. After being thoroughly saturated, sufficiently to remove all extraneous substances, such as gums, oils, and alkalies, it is taken out and thoroughly washed in clean, pure water, when it is placed in the generator and charged with strong vinegar, in the same manner as corn-cobs or charcoal, as has been before described. By removing the corn-cobs about every six months, where they have been used in the apparatus, and carefully washing each by hand in warm water, they may be made to last almost an indefinite period; when once thus washed, although involving much labor, they become greatly superior to fresh cobs for the purposes of a generator, and are much less expensive than shavings. Care should be had in laying the first two or three courses, after which they may be placed in indiscriminately.

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* Some distribute through a revolving, perforated partition or sieve, which is driven slowly by a pulley and belt, affixed to a wooden upright shaft.

Some vinegar manufacturers have adopted the patent generator, the principle of which is the same, only that the ferment is mingled with the vinegar fluid, and is exposed on flat surfaces in tiers of platforms, or tables.

It may be briefly described as follows: A board or plane is prepared, of the required width and length, which forms one table or platform; this is divided into equal divisions of an inch and a half in width, and grooved so as to admit of a narrow strip, say an inch in width, which is inserted edgeways in the platform or table. Each alternate strip forms a close joint at one end, with another strip fastened upon the edges of the table, while at its opposite end a space of an inch is left for the vinegar fluid to pass around the end between it and the strip, fastened to the edge. At one corner of the table an aperture is made. A series of these platforms are placed one above the other, to the number of twenty or more, and so arranged that each alternate table is slightly elevated at its opposite ends. The operation consists in allowing a small flow of the vinegar fiuid to run continuously upon one end of the upper table, which follows the conduits made by the strips described. The fluid traversing these conduits from one side of the table to the other, gradually reaches the end, where it passes through the aperture to the table below, and after traversing the conduits reaches upon the second table the point, near where it was first introduced, whence it passes through an aperture to a third table, thus alternating in all directions, traveling several thousand feet in passing the series of tables, and being exposed to a warm atmosphere, it is at last converted into vinegar. These tables are easily cleaned of sediment, and ensures a constant flow of the liquid, a desirable point in vinegar making under the quick process.

Another plan recommended, and which answers a very good purpose where a small quantity of vinegar is to be manufactured, is to take a shallow tub or tank, and mix in it equal quantities of good, strong vinegar and vinegar fluid which has undergone the vinous fermentation, and place the same in a warm apartment, where the temperature may be uniform at about 90° F. With an air force-pump inject into the liquid through wood, vulcanized rubber, or glass tubes, the heated air, in such quantities as to cause a constant agitation of the contents of the tub, which will in a short time convert the whole into a good article of vinegar. By this means there is, necessarily, considerable loss by evaporation, and the principal points to insure success are an equable temperature and pure heated air. The pumps should be arranged so as to be driven by machine power. When the acetous fermentation has been perfected, one half of the vinegar may be removed and placed in casks, and another supply of the warm vinegar fluid added. In order to remove the various objections to this plan which have been found to exist, a modification and improvement has been made, by first having the apartment heated with hot air from a suitably devised furnace, which would furnish a constant supply at a uniform temperature. The vinegar fluid to be converted into vinegar, is prepared in an upper apartment, and kept at a temperature of about 100° F., in a suitable tub, to which is affixed a discharge pipe made of wood, and connected with the bottom of the generating tub by a hole through its side. This tub may be of any diameter, but should not be more than five feet in height. Two perforated partitions are placed in the tub, eighteen inches apart, the lower one eighteen inches from the bottom, and the upper one eighteen inches higher; about twelve inches above the upper partition, a wooden faucet is inserted, to draw off the vinegar, also another at the bottom, to draw off the contents. The perforated partitions are so constructed that they may be removed at any time, or fastened in their proper places when the apparatus is in operation. The top of the generating tub is provided with an air-tight cover, having an aperture to be opened only when the generator is charged with vinegar; in the top of the cover is fitted a wooden pipe, at least two inches or more in diameter inside, which connects with a worm or condenser placed in another tub filled with running cold water, and so arranged that a wooden pipe, leading from the condenser, will discharge its contents regularly into the bottom of the generator. Attached to the worm or condenser, at about ten inches below the top of the water in the tub, is a two-inch metallic pipe, which connects with a flue in the wall of the building; this forms a ventilator or chimney from the generating tub, through which the air may pass, and at the same time the condenser checks the evaporation that otherwise would escape. By means of wooden pipes, or vulcanized rubber hose, attached to an air-pump, bellows or blowers, operated by machine power, the heated air of the apartment is driven into the bottom of the generating tub, which is first half filled with old, strong vinegar, to serve as a ferment, when in about fifteen minutes, or as soon as the vinegar in the generating tub has become warm, the vinegar fluid is admitted by means of a faucet, and allowed to flow at the rate of a gallon every six minutes. As the generating tub becomes filled, the blast of air is increased; the perforated partitions serve to distribute the air through the vinegar fluid of the apparatus, readily converting it into vinegar. If, at any time, it be discovered that the transformation has not been complete, the supply and discharge faucets may be closed until the desired change be effected, when the regular operations may be resumed. The discharge of vinegar at the upper faucet* should at no time exceed the supply of the vinegar fluid to the generating tub, and whenever air is discovered emerging through the faucet with the vinegar, it should be closed until an additional supply be manufactured. This apparatus is easily regulated in all respects; it makes a uniform article of vinegar; is rapid in its operations, and allows a constant flow; prevents loss by evaporation; is easily constructed, and comparatively inexpensive. Under the quick process for making vinegar, before mentioned, reference has been had to the nature and character of the vinegar fluid to be employed, with the view of discarding all substances, such as sugar and molasses, in its preparation, as these substances have a tendency to clog the apparatus, by large accumulations of the mother of vinegar, and foreign matters, rendering it liable to become moldy, thereby necessitating frequent cleansings. Where it is desirable to convert sugar or molasses into vinegar, it should be done in some other manner, instead of running the vinegar fluid through a generator filled with shavings or the substances which have been described. Either of the other generators may safely be used for that purpose, without meeting with the objections stated.

The character of the vinegar fluid to be employed under the quick process, has especial reference to that prepared from cider, wine, or alcohol, as all of these fluids may properly be reduced with pure water. The maximum limits to be fixed for the alcoholic strength of the vinegar fluid, should never be allowed to exceed ten per cent.; about six per cent. of alcoholic strength, as a general rule, is the best, as in a stronger mixture there exists a greater danger of loss by evaporation in the manufacture, and at the same time the energy of the vinegar fermentation appears to be somewhat neutralized by the excess of alcohol.

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* The difficulty may be obviated by using a goose-neck faucet.

Again the limits of temperature may be given, the lowest at 72°, and the highest at 100°, F.; within these limits, the higher the temperature, with an increase of air brought in contact with the alcoholic solution or vinegar fluid, the more rapid is its transformation into vinegar, involving a loss of alcohol, which, perhaps, may be fully balanced by the rapidity of the process. The vinegar produced is limpid as water, and consequently some simple, harmless coloring matter may be introduced, in order to suit the public taste, as an extract from roasted barley malt, an aqueous solution of burnt sugar, or an infusion of chicory coffee.

Pure cider contains about ten per cent., by volume, of alcohol, and makes a stronger vinegar than is generally needed; water, therefore, may be profitably added, reducing the cider so as to contain about six per cent. of alcohol, which will yield vinegar of the proper acid strength. In the preparation of the vinegar fluid, where three generators are used, the cider may be mixed with soft water, in the ratio of seventy gallons to one hundred gallons of water, adding the proper proportion of ferment. After this has been passed through the generating apparatus, then another addition of seventy gallons of cider is mixed with the product, and the same passed through the second generator. To this product another like quantity of cider is added, which is again passed through the third generating apparatus, which accomplishes the same result as by the addition of alcohol at each time, and measurably saves the loss of aldehyde, before mentioned.

Pure water, is an essential thing in vinegar making as the earthy salts in hard water retard the vinegar process, and the carbonates of lime, magnesia, etc., neutralize a certain proportion of the acid. Water that contains organic matter putrefies, and yields vinegar of inferior keeping qualities. The iron of other waters unites with the tannin of the barrels in which the vinegar is stored, giving it an inky color. The softer the water the better it is for making vinegar; hence pure, soft and clear spring or river water, is the best, next, purified rain water, and lastly, purified well or spring water. Hard water may be improved by boiling, exposure to the air, and by filtering; charcoal filters are the best. Rain water should also be filtered through charcoal, to remove the organic matter which it contains, and which is capable of putrefaction.

The more ferment present, the quicker is the vinegar process; vinegar, however, is the best ferment. Certain others, which are nitrogenized bodies, are frequently employed, such as brewers' yeast, bread soaked in vinegar, leaven, corn meal, a small portion of dough, made of wheat and rye flour; these are used in very small proportions, a few ounces to a barrel of vinegar fluid. But it must be remembered, that the greater the quantity of such nitrogenized bodies present, the more apt the vinegar will be to spoil. Whenever used in the quick process, they form putrefying deposits in the generator, and it soon becomes moldy. Some manufacturers, with a view to increase the acid of the future vinegar, add to the mixture or fluid, juices of sweet fruits, extract of raisins, honey, syrup, beer, and a variety of other saccharine substances; others add these to their manufactured vinegar, that it may strengthen by age. Such additions are wrong, and proceed from an imperfect knowledge of the principles of the vinegar process. The sweetness marks the acid taste of the vinegar, and also injures its keeping qualities. Vinegar being a weak solution of acetic acid, and containing foreign matters, the weaker it is, the greater the liability to spoil. (This liability to spoil depends upon the nature and quantity of the foreign substances it contains.) Vinegar of the lowest grades contain two per cent.; the better grades from three to six per cent.; and the best, which is wine vinegar, as high as ten per cent. of acid.

For preserving vinegar, the better plan is to add pure alcohol, in the proportion of one pint to the barrel of vinegar; this increases the keeping qualities, and prevents mold and putrefaction. The alcohol in the casks, at their low temperature, is converted very slowly into acetic acid, and, technically speaking, it may be said that the vinegar lives upon the alcohol. It is advisable, therefore, where vinegar has been long in store, to add alcoholic spirits to vinegar, from time to time, to preserve it. An elevated temperature has a tendency to hasten decomposition in vinegar, and therefore it is always better to have it stored in cool, well ventilated places, avoiding damp and moldy cellars or stores.

IMITATION VINEGARS, are a class of vinegars commonly found in market, having various chemical properties, and none of a preservative character, as they fail to protect, and are liable to consume whatever substance they come in contact with. Upon this point, we take pleasure in commending from the public press such articles as the following, from the *Scientific American*, which cautions the public against the use of adulterated vinegar. It says "the heavy government tax on alcohol has raised the price so much that resort is had to a cheaper substance, to give the required acidity to vinegar. For this purpose sulphuric, nitric, and hydrochloric acids are all used; though sulphuric acid, as the cheapest and sourest thing that can be found, is chiefly used. This, however, is very destructive to pickles, and whatever is placed in it for preservation, and very injurious to the health of those who use the vinegar made of it. A gallon of the stuff called vinegar can be made for a cent or two, from sulphuric acid and water, with some coloring matter. To detect the presence of sulphuric acid, take a small quantity of the vinegar in a clear glass, and drop a few drops of the chloride of barium into it, or the nitrate of baryta. If the liquid presents a cloudy appearance, there is sulphuric acid in it, and it should all be returned to the manufacturer or turned into the gutter." These vinegars are ingeniously manipulated by the use of volatile ethers, and flavored by storing in casks containing powdered tartar, crushed raisins and raisin stems, with various other substances not necessary to mention, which, in most cases, are found to succeed in deceiving consumers, and entailing losses which greatly exceed the necessary outlay in the first place for a good article. Such losses are usually attributed to other than the right cause, and the real one is not discovered until too late to remedy the difficulty.

For the convenience of merchants, grocers, and those who desire to manufacture their own vinegar, by the conversion of such materials or substances as they may have on hand adapted to that purpose, and which otherwise might run to waste or be wholly lost, the following information has been given, together with various modes practiced by many intelligent persons in various sections of the country. Vinegar manufactured in the manner described, will be found far superior for household purposes to any adulterated, imitation or dangerous compounds, no matter how manipulated or by whom recommended. It has the advantage over most marketable vinegars, in the fact that the ingredients are known as well as the mode of manufacture, and if it fails in its preservative properties, such failure must be attributed to the want of a sufficient supply of the alcoholic principle, and not to the excess of sulphuric or nitric acid.

In order to make vinegar out of molasses, it should be reduced with warm rain or soft water, in the proportion of ten to one, some say twelve parts water to one of molasses, and one half the quantity of yeast that there is of molasses. Mix in a jug or keg, and expose to the air. In a small way, say water, three gallons, molasses, one quart, and yeast, one pint; mix all together, and place the mixture in a jug or keg; tie a piece of gauze over the aperture, to keep out flies and let in air. Set the keg in the sun if the weather be hot, and if cold, set it by the stove or in the chimney corner. It is said that in three weeks time the result will be good vinegar. The keg may be kept replenished, after drawing out a portion for use, by filling it up in the same proportion as at first, or the proportion of the ingredients may be varied as follows, which, of course, will make a stronger article; say two quarts of New Orleans molasses, four quarts of yeast, and five quarts of warm rain water. Merchants and grocers who retail vinegar, can always have a supply on hand, by having several barrels out of which to sell, by filling the first one when two-thirds empty, by adding in the ratio of eleven gallons of soft water and one gallon of molasses to fill the barrel; as the vinegar and mother which is left in the barrel accelerate the fermentation, and by treating all the other barrels in the same manner, and keeping them in a warm place, a constant supply of good vinegar may be on hand, provided the sales per week do not exceed one quarter the number of barrels devoted to the purpose of creating a vinegar supply

The proportion of a gallon of molasses to a barrel of cider, mixed, warmed in a kettle, and put in a cask, with some yeast, or corn meal, and a few sheets of brown paper, will soon make good vinegar. It should be kept in a warm place, with the bunghole open, to admit the air. The scum which arises should be frequently broken with a stick so that the air may not be excluded. The vinegar may be drawn as needed, and its place supplied with cider, which also in its turn will be converted into vinegar.

Another mode is to take an open tub, place it in some secure, sheltered place, where it can have the sun and be protected from disturbance; pour in a few quarts of good vinegar, also the same quantity of good cider; let both be warm. This mixture will soon become vinegar; then continue to add cider, according to the heat of the weather, and the ascertained progress of the contents of the tub. When the tub is full, place the contents in a barrel, and remove to a cool cellar. When the vinegar is forming in the tub, protect it from insects, and at the same time allow a free circulation of air to the contents of the tub. In the absence of cider, weak, poor wine, molasses and water, or alcohol and water, may be used; the juice of currants, also of grapes, or the pomace of either; the juice of tomatoes, sweetened with molasses, will make good vinegar; over-ripe peaches, and waste fruit of any kind, put into barrels containing rain water, and allowed to remain until the water is strongly impregnated with the juice of the fruit, will also make good vinegar. Rinsings of molasses barrels, or drippings of sugar hogsheads, reduced with water, and, the *Scientific American* says, the juice of watermelons, boiled down one-half, will make a vinegar equal, or next, to cider vinegar. The water in which dried apples have been soaked and washed, apple parings and cores, allowed to ferment in water, then strained, with the addition of sugar or molasses, will make vinegar. Honey, one pound, cider, one gallon, well mixed and kept in a warm place, will in a few months become so strong a vinegar that water will be necessary to dilute it.

A. A. Crumpton, of Illinois, gives his experience as follows: "As I have seen, from time to time, enquiries for making good vinegar, I will give you the way I made a half-barrel, some two years ago, which we have been using out of ever since, and it is now better than ever, and pronounced by all who have tasted it the best for strength and flavor they have ever tasted; in fact, we never dare use it full strength. In the spring, I had left several gallons of a barrel of cider, that got too sharp for drinking, to which was added nearly as much soft water, a lot of refuse molasses, the remains of a keg of beer left from the previous harvest—probably another gallon—two handfuls of dried apples, a piece of brown paper dipped in molasses, to form the mother, then added a cake of dry yeast, and let it go to work, with a piece of musquito-bar over the bunghole. Then, when fruit-canning time came, we had several kinds (raspberries and strawberries,) which, from imperfect sealing, fermented; these went into my keg; then all the apple and peach parings were saved, put down in a stone jar, and covered with soft water, and allowed thoroughly to ferment; then strained and the liquor added to my keg, with a little molasses, from time to time, and by the end of summer we had excellent vinegar; and we have been using, as I said, nearly two years from that same keg, saving apple parings and fermented can fruits to keep up the supply, or sometimes adding water and molasses, if it gets down much. There is a fine mother formed in the keg, which acts the same as the celebrated vinegar plant, converting every saccharine substance, into vinegar."

For an instantaneous vinegar, take one pound, or one pint, or any other quantity of acetic acid, (which may be called concentrated vinegar,) and add seven times as much soft water, and the result will be good vinegar, preferred by many to that made from cider. Where acetic acid and molasses are used, the manner of producing vinegar in about three weeks time, is to take one gallon of molasses, four pounds of acetic acid, and mix with forty gallons of soft water; shake it up well, and let it stand If this be found not as strong as desired, add a little molasses from time to time, until it acquires the proper acid strength. Many people, however, object to vinegar made in the way last described, and will have none except it be made from cider. Assuming, therefore, that all such have plenty of cider, and a warm room in which to make vinegar, all they will have to do is simply to place on end as many barrels or large casks, without heads, as will hold the desired quantity to be made; then fill these casks one-third full of soft water, and the other two-thirds with apple cider, adding two quarts of yeast to each cask. In a few weeks the result will be good vinegar; if the yeast be omitted, it might require the entire season to produce the desired change. If more vinegar is to be made, draw off all excepting about one quarter, which leave in the casks, and fill them up with water and cider as before, when a much quicker transformation will take place Cider may be used without the water, but it makes vinegar almost too strong for any one to use, and besides, requires a much longer time in making.

Some accelerate the process of vinegar making by placing the vinegar fiuid in a cask painted black, and exposing it to the rays of the sun, with the bunghole left open, to allow the air to come in contact with the contents of the barrel; it is claimed that the color of the barrel enables all the heat of the sun to be made available in cool seasons.

We conclude this chapter on vinegar, by the addition of the following statements, relating to cider making for vinegar, which contain many suggestions worthy of consideration: W. H. Regan, in the last report of the Indiana Horticultural Society, says that he assorted his market apples of good varieties, and used the small and irregular specimens for cider. He obtains more for the best selected fruit thus obtained, than for the whole unassorted, the poor ones spoiling the appearance of the whole. He found it important to keep every thing clean; in one case, a barrel of cider was spoiled by spilling some petroleum on the head, although none entered the barrel at the bunghole. Hand mills were worthless. The best mill that he had found, (most economical, simple, and durable,) was a grater mill, with a cylinder ten inches in length and diameter, driven full of shoemakers' heel-tacks, which were then ground down with a file to about one-eighth of an inch in length. Attached to a shaft, and driven by one or two horses, it would grind a bushel per minute, so fine that many of the seeds were cut up. The mill was on a frame, over a large vat, holding sixty or eighty bushels of apples when ground. The pomace lay in this vat twelve to thirty-six hours, varying with the temperature of the weather. If the seeds are much cut, the time must be shorter, as they impart a bitter taste. *The cider is better than if pressed immediately after grinding.** President Nelson furnished a valuable essay on making cider for vinegar, and spoke of the detestable made stuff sold generally, composed of oil of vitriol and various drugs. The only good vinegar, of the best quality, is made from pure cider. It has a peculiar, rich, aromatic odor, by which it is distinguished from the common spurious stuff, although attempts are made to imitate its odor, by adding fusil oil and burnt sugar. The best vinegar is not injured by freezing, but the "acid" vinegar has been entirely spoiled—rendered putrid—by freezing in the barrels a single night. Some of this material was called "wine vinegar," and was claimed to be made from wine; a pretense obviously false, as no wine was so low in price as the best vinegar.

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* Evidently laboring under an erroneous impression, on account of the color.

HOW TO MAKE CIDER VINEGAR.—The following is Mr. Nelson's mode of manufacturing vinegar, which we give at length, as it may furnish some valuable suggestions at the season of cider making: "My cider house is constructed with a view to convenience and economy in the manufacture of cider and vinegar, and is used for both alternately, as the season requires. During the fall, and until all the apples are ground up, I make all the cider I can store away in pipes, barrels, etc., under an open shed convenient to the cider house, where it will generally undergo vinous fermentation, and by the addition of a little good, strong, old cider vinegar, frequently gets quite sour before cold weather, and sometimes is fit for market by adding a little more strong vinegar. As soon as we are through making cider for the season, we remove the horse power (endless chain) grinder, pressing crib, vats, pomace boxes, etc., out of the basement of the cider house, and commence at once filling it with double and triple tiers of barrels of racked cider from the shed; start up the fire in the furnace, which is so constructed as to be out of the way when making cider, and the cider house is thus quickly converted into a cheap and excellent vinegar house. The thermometer is kept at about 75° Fahrenheit, and the process of vinegar making commences at once. If some of the casks appear a little 'lazy,' and not inclined to make vinegar as fast as they should, I take empty casks, and put four gallons of the best vinegar in each, and drip slowly the contents of the sluggish casks, sometimes through hard wood shavings, but more generally over a board, into a dripping trough, then into the casks prepared as above, the object being chiefly exposure to atmospheric air, by reason of which it becomes acetified. Thus it is quite frequently the case that the laziest casks are first fit to go out of the vinegar house, which we remove, as well as all others, as fast as they are ready, to the cellars, where they remain until required for market, so that by the time the house is required again for cider making, all the old cider is converted into vinegar and removed out of the way. The endless chain horse power, cider mill, vats, etc., are put back in less than half a day, and the vinegar house is now converted into a cider house again, and the work goes on as before. The apples are scooped out of the wagons, and thrown upon the upper floor through a convenient door, when they run off on an inclined plane to such part of the chamber as they are needed, or at once thrown into a hopper that feeds itself. The whole work is done with a small amount of labor, which is one of its chief recommendations. This is, in brief, my method of working up a few thousand bushels of apples, many of which were formerly wasted, or from which I realized a very insignificant sum. The same thing is within the reach of any farmer who can command a few hundred dollars to start with on a cheap scale, and out of which, if he has the apples himself, or can purchase them at a reasonable price, he may soon build up a lucrative and legitimate business, and at the same time be of permanent usefulness, in furnishing consumers with a genuine article of healthful acetic acid, to take the place of the poisonous stuff now in general use."

For those who do not wish to manufacture for market, but merely to make their own vinegar, he gives the following directions: "Purchase, if you do not have it yourself, a barrel of sweet, rich juice, made by a reliable man from sound, ripe apples; get a good iron-bound barrel, paint it well with two coats of white lead and boiled oil; purchase ten or fifteen gallons of pure, strong, cider vinegar, and put it in the iron-bound cask; place both casks in the cellar or other convenient place, with faucet in each and bungs out. After the juice has thoroughly fermented and settled, commence putting the cider into the vinegar cask; a good rule is to put in twice the quantity, and as often as you draw out the vinegar. Thus managed, you will, in a reasonable time, have a full barrel of vinegar, equal to the original, and need have no further trouble about not having always at hand an abundance of pure, rich, healthy, high-flavored, aromatic vinegar."

NOTE.—Those desiring more complete information on the science of vinegar making, are referred to a work published by Charles M. Wetherill, in the year 1860, on the theory and practice of vinegar manufacture, to which we are largely indebted for many facts incorporated herein. We also take pleasure in referring to a work now in press, which will probably be published simultaneously with this by Henry Carey Baird, Philadelphia, entitled, "A general Treatise on the Manufacture of Vinegar, Theoretical and Practical; by Professor H. Dussauce," of New Lebanon, N. Y.

CHAPTER IX.

About Barrels and Casks.—Various Modes for Cleansing them.—By Hot Water or Steam.—Removing Must.—Pres't Starr's process for treating Casks.—Reemelin's method.— McKenzie's process.— With Bran or Meal; Sulphuric Acid; Quick-lime.--Charring process.—With Soda.—Alkali process, etc.—Six Reasons for Planting an Orchard.—Observations on the Protection of Fruit Trees from Mice, Apple-borers, Moths, etc.

In relation to the preparation of barrels and casks for the storage of cider and wine, a few words may be necessary, as, after bestowing the care and labor essential to produce a good article, it may be all lost, by placing the liquor in old, second-hand, foul and musty barrels, or casks. If such casks have to be used, those that have contained alcohol or whisky are the best. Cider should never be put into old wine casks, as, after all the soaking and washing possible, there will still remain a large amount of foreign matter, which will eventually destroy the taste and flavor of the liquid. Mold or fungus is generally found in old casks, and it cannot be wholly destroyed without injecting boiling water or steam into the cask or barrel. If boiling water is used, the barrel should be completely filled, and allowed to remain for some time; consequently steam from a boiler is the best. This is not supposed to be usually convenient to a cider mill, and where barrels cannot be thoroughly scalded, the better way is to reject them altogether Sometimes it happens that cider makers, in manufacturing for customers, are compelled to use such barrels as are furnished them, and where they wish to preserve their reputation for making a good article, they should mark or brand upon the head all barrels found to be musty, with the word "musty," in plain letters. The cider contained in such barrels may be corrected, by boiling the same, and adding to it some pieces of charcoal, which will measurably remove the musty taste. Where the cider has been refined, it should never be put into any thing in the way of casks, except they be new, clean, and sweet; and even of new barrels, President Starr, of the Alton (Ill.) Horticultural Society, says: "To prepare new oak barrels for wine or cider, use one pound of alum and four or five pounds of salt, to four bucketfuls of water; heat boiling hot, and put one bucketful at a time in the barrel; rinse thoroughly; let it stand an hour; turn it out, and repeat the operation with another bucketful. Finally, rinse with water and fumigate with sulphur, and it will be all right."

Reemelin says: "The usual way of cleansing casks, is by washing them first with warm water, and then with cold. Casks that have become foul should be rinsed out with chloride of lime, in a solution of the consistency of milk, and the lime immediately after washed out well with water."

McKenzie says: "The way to sweeten a foul cask, is to set fire to a pound or more of broken charcoal, put it into the cask, and immediately fill up the cask with boiling water. After this, roll the cask once or twice a day for a week; then pour out the charcoal and water, wash out the cask with clean, cold water, and expose it to the external air for some days."

An old cider maker says he has "found it a better plan to burn up the cask altogether, and use a new one instead."

Another method of cleansing foul casks, is to fill them with meal or bran and water, and let them stand till fermentation takes place; it will entirely cleanse them without expense, as the mixture is as good for food for swine, as before.

A practical chemist furnishes the following rules for preparing and sweetening musty casks:

"First. Wash them with sulphuric acid, and then with clear water; afterwards wash them well out with hot water.

"Second. For large casks, unhead them and whitewash them with quick-lime.

"Third. Or, match them with sulphur, mixed with a little nitrate of potash, and afterwards wash them well with water.

"Fourth. Char the inside of the staves. Observe in every case to *scald* or *well wash* out the casks before use."

When barrels have been emptied, and cleansed thoroughly, as previously stated, they may be kept sweet by bunging them up close and excluding the air.

"A new keg, churn, bucket, or other wooden vessel, will generally communicate a disagreeable taste to any thing that is put into it. To prevent this inconvenience, first scald the vessel well with boiling water, letting the water remain in it until cold; then dissolve some pearl-ash or soda in lukewarm water, adding a little lime to it; wash the inside of the vessel well with this solution. Afterwards scald it well with hot water, and rinse with cold water, before you use it. The reason for this is, the ready combination of resinous matter with alkalies to form compounds soluble in alcohol." This is the method proposed in Coleman's *Rural World.*

For another alkali process to cleanse barrels, see chapter VI, page, 89, under "Dr. Loomis' plan for preparing cider." Also, see "Glycerine," under chapter V, for valuable hints.

SIX REASONS FOR PLANTING AN ORCHARD.

Having given the various processes for manufacturing cider, wine, champagne, and vinegar from the apple, and shown in what manner that fruit may be made to yield large profits to the producer, we deem the following not inappropriate to the object of this work, being six reasons given by Edson Harkness, Esq., on the moral and practical benefits to be derived from the possession of an orchard of good fruit:

"First. Would you leave an inheritance to your children? Plant an orchard. No other investment of money and labor will, in the long run, pay so well.

"Second. Would you make home pleasant,—the abode of all the social virtues? Plant an orchard. Nothing better promotes, among neighbors, a feeling of kindness and good will, than a treat of good fruit, often repeated.

"Third. Would you remove from your children the strongest temptations to steal? Plant an orchard. If children cannot obtain fruit at home, they are very apt to steal it; and when they have learned to steal fruit, they are in a fair way to learn to steal horses.

"Fourth. Would you cultivate a constant feeling of thankfulness towards the great Giver of all good? Plant an orchard. By having constantly before you one of the greatest blessings given to man, you must be hardened indeed if you are not influenced by a spirit of humility and thankfulness.

"Fifth. Would you have your children love their home, respect their parents while living, and venerate their memory when dead? in all their wanderings look back upon the home of their youth as a sacred spot, an oasis in the great wilderness of the world? Then, plant an orchard.

"Sixth. In short, if you wish to avail yourself of the blessings of a bountiful Providence, which are within your reach, you must plant an orchard. And when you do it, see that you plant good fruits; do not plant crab-apple trees, nor wild plums, nor Indian peaches. The best are the cheapest."

It may be proper in this connection to state, although at variance with the original design in the arrangement of the "Cider Makers' Manual," that there exists a still greater obligation on the part of all persons who have planted an orchard, to see that it be carefully protected from mice and such vermin as are liable to attack and destroy orchard trees, in order that the time and labor expended may not ultimately be wholly lost.

We have been strongly reminded of this important fact, since this volume has been in press, from various published statements which have come under our observation, relating particularly to the vast destruction of apple trees during the past winter, through the ravages of mice, and, notwithstanding the immense loss, which has followed from the neglect of orchardists, in not using proper measures to protect their orchard trees, we are nevertheless gratified to learn that the plan of making composts of clay and earth, also treading down the snow about the orchard trees, wherever fully practiced, has been effectual in all cases. Again, it appears that the apple-borer has been even more destructive in some sections the past season, than the mice before referred to. The exercise of great vigilance and constant watchfulness seems necessary, to prevent the destruction of fruit and ornamental trees by this troublesome borer, the parent of which appears to be a fly or beetle. The eggs are deposited in the bark, near the ground, some time in the month of June. The eggs hatch and the young eat their way into the wood, on which they feed until maturity, when they eat their way out, changing into beetles, and again depositing their eggs for a new crop. Besides the remedy mentioned on page 20, occasional rubbing th trunk of the tree with a corn-cob, or with some har substance, to destroy the larvæ, has been highly recommended. If by this process there be found black, hard spots upon the outer brown bark of the tree, the the presence of the enemy may be justly suspecte If, upon cutting away the bark, a slight cavity is foun in the sap wood, filled with a substance resembling sawdust, then probe the cavity and find the borer—a white, flattish grub, with a hard, reddish brown hea and soft body—which destroy.

The plan of wrapping the base of the tree with stiff paper, and having the lower edge below the surface of the soil, has also been recommended as a preventive against furnishing a place of deposit for the eggs.

We have described, on page 21, a plan for destroying the apple or codling moth, by winding bands or ropes of hay or straw about the tree, which is called Dr. Trimble's method, who recommends, instead of burning them, to slip the bands up every few days from the middle of July to the middle of September, and destroy the cocoons that have from time to time been formed on the bark underneath it. It has long been known that by placing an old cloth, or any thing of that nature, in the crotch of an apple tree, the apple worms may be decoyed into building their cocoons underneath it, and thus be destroyed wholesale. When we consider that every female moth that hatches out in July or August, from the first brood of apple worms, will probably deposit an egg in some two or three hundred nearly matured apples, thereby rendering them unfit for anything, except it be for vinegar purposes, the necessity of destroying by hog power the wormy windfalls in the early part of the season, at all events, becomes at once apparent.

CHAPTER X.

Imitation Cider.—Cider Beer.—Perry Wine.—Quince Wine.—Gooseberry Wine.—Currant Wine.—Cherry Wine.—Elderberry Wine.—Honey Wine, (metheglin).—Rhubarb Wine.—Rhine Wine.—Sherry Wine.—Claret Wine.—Sham Champagne —Imitation Champagne.—British Champagne.—Cider Champagne.—Summer Beverages, such as Portable Lemonade, Persian Sherbet, Imperial Cream Nectar, Soda Syrup, Cream Soda, Ginger Pop, Spanish Gingerette, Ginger Beer, Root Beer, Spruce Beer, Aromatic Beer, Lemon Beer, Sparkling Gas Beer, Corn Beer.—Vegetable and Aromatic Vinegars.—Miscellaneous Receipts, etc.

As the foregoing pages, have been almost exclusively devoted to the product of the apple, its juices, manipulations, etc., we have thought it expedient in this, the concluding chapter, to treat upon such miscellaneous subjects as might naturally be expected to be found in a work of this character. We shall therefore embrace such subjects as imitation ciders, various kinds of wines, summer beverages, fancy vinegars, etc.

In many parts of the country, where cider is not made, and commands, therefore, a high price, the cupidity of the trader, and perhaps a desire on the part of the producer also, or those who have to furnish that article, are stimulated to adulterate it. Whatever the incentive may be, it does not render it necessary for us to make any revelations, as long as it is our province to supply the information necessary for the preparation of such imitations, as well as the instructions requisite for the manufacture of the genuine article.

IMITATION CIDERS, are made by the mixture of five gallons of good, sweet cider, two gallons of fruit vinegar, or common wine vinegar, two gallons of white syrup made from sugar, twenty-five gallons of water, with the addition of one ounce each of the oils of apple and pear. This imitation cider tastes very well, and may be made to keep for a length of time, by adding about one gallon of pure spirits.

Another imitation, omitting the cider, sometimes called Cider Beer, is made in the proportion of one gallon of cold water, one pound of dark brown sugar, half an ounce of tartaric acid, and four tablespoonfuls of yeast. These ingredients should be shaken together, and in twelve hours the preparation will be fit for use. A few gallons may be made at a time, and by leaving a few quarts in the keg, it will serve to make into the next time, thereby dispensing with the yeast until the keg needs rinsing. If it gets a little sour, make more into it. Where this imitation cider is designed for long keeping, it should be made in a tight, clean cask, by putting into twenty gallons of cold water, fifteen pounds of dark brown sugar, with half a pound of tartaric acid, omitting the yeast, and putting in the expressed juice obtained by boiling three or four pounds of dried apples instead; or, if the dried apples are not readily obtainable, then add two gallons of cider; these last two articles, or either of them, improves the liquid, but they may also be dispensed with. Without the yeast, this cider will keep for several weeks in a cool cellar, even in warm weather.

Another way of preparing it for bottling, is to take three pints of hop or brewers' yeast, and work it into a paste with three-quarters of a pound of flour; then take thirty pounds of brown sugar, three-quarters of a pound of tartaric acid, which mix in a barrel with five gallons of warm water. After it has been thoroughly incorporated by shaking, add twenty-five gallons of cold water, and stir all together, observing that the barrel be full; leave the bunghole open, and allow the mixture to ferment for twenty-four to forty-eight hours, or until the yeast has done working. When the liquid has become clear, bottle it, and place in each bottle a few broken raisins, and keep in a cool place, with the bottles upon the side. This is said to make a cool, sparkling, effervescing drink.

PERRY WINE, is made from the extracted juice of pears, in the same manner as cider, and is a very pleasant beverage. The juice contains little else than sugar and water, and easily turns sour unless condensed by boiling, or sugar is added. It is the lowest in the measurement by the saccharometer, of any of the fruit juices named in the introductory chapter, and should be made from such pears as are least fit for eating, and must be quite dry, and the redder they are the better. It requires little or no preparation, except fining with isinglass, when it should be put into good, strong bottles. If bottled in hot weather, it should be left a day or two uncorked, in order that it may get flat; but if too flat in the cask, and wanted for immediate use, put into each bottle a small lump or two of sugar candy, or a few broken raisins. then see that the bottles are securely corked. In many parts of Germany, a most pleasant tasting, sparkling pear wine is made, by putting it into strong stone jugs, holding about a quart, or into such common bottles as can resist a heavy pressure. It sells well, but as a food it has little value, and is not easily transported. In some sections of California, the pear is produced in great abundance, and, owing to the peculiar atmosphere, it is thought the fruit is better adapted for making Perry than in any other section of this country.

QUINCE WINE, is made by boiling for half an hour the expressed juice of quinces with its equal weight of water, and adding one pound of sugar to each half gallon of the watery juice, and also the white of an egg, which is stirred up with some water, and brought to boiling, over an open fire, so as to boil slowly, whereby the scum is taken off. The whole is left to ferment, in a cask, for about six weeks, when it is fit to be drawn off and placed in bottles, to be quickly tied and wired, when in about four weeks it will be ready for use.

GOOSEBERRY WINE.—For producing a superior wine, the unripe berries should be used. The berries should be squeezed, and an equal quantity by weight of sugar added; after being left for one day, it should be then pressed. To the juice so obtained, add one-quarter of its weight of sugar, and one-eighth of water, and a little cream of tartar; then leave the mixture for two days at a warm temperature. As soon as the fermentation begins, the liquid is put into barrels, filled up to the bunghole, until the fermentation diminishes, when the bung is driven into the barrels. Keep in a cool place for two or three months, when the liquor should be drawn off from the yeast, and add one gallon of pure spirits to each forty gallons; fine with isinglass, and after four or five days, when clear, it should be bottled, quickly corked and tied over.

CURRANT WINE.—The berries, separated from the stems, are pressed, and the juice mixed with an equal quantity of water; and to each gallon of liquid add two and a-half pounds of sugar, two ounces of cream of tartar, and one ounce of pulverized nutmegs, with one quart of alcohol. Allow the whole to ferment; then fine with isinglass, draw off and bottle.

Another method is to express all the juice possible, then take an equal amount of boiling water, and pour on the pressed fruit; let it stand for two hours, squeeze out as much as there is of juice, and mix; then add four pounds of brown sugar to each gallon of the mixture; let it stand for three or four weeks, until fairly worked, with the bung out, and when it is done working, bung it up, then place in a cool cellar, where it will not freeze.

CHERRY WINE, should be made from sour cherries, as sweet cherries have very little of the free vegetable acid needful for wine. The wine made from the sour fruit has a beautiful deep red color, and a fine alcoholic, tartish taste. The mashing can take place, including the kernel, and the fermentation is best made over the whole mashed mass. It needs little sugar or condensation; sugar and water can be added or not; the best wine may be obtained from the pure juice. After it has fermented, it may be fined, drawn off, and bottled Or if preferred, it can be treated in the same manner as the last formula given for currant wine.

ELDERBERRY WINE.—To one hundred pounds of the berries, free from stems, squeezed and boiled, add fifty pounds of sugar, two pounds of cream of tartar, and thirty gallons of water, and let the liquor ferment like other berry wines. If a little yeast, ginger, raisins, and cloves be added, it will yield, at the termination of the fermentation, a wine similar to the Cypria, or Greek wine.

HONEY WINE, (*metheglin*,) an old, time- honored, German beverage. It is prepared by diluting one pound of honey with four pounds of water; boiling them for one hour, (skimming continually,) leaving to ferment with yeast, and hanging into the barrel a bag containing several bruised spices, such as coriander seed, cloves, ginger, calamus, each half an ounce. The fermented liquor will be clear after one month.

RHUBARB WINE.—Take of the expressed juice of the garden rhubarb, one gallon, and add one gallon of soft water, and seven pounds of brown sugar. Fill a cask in this proportion, and allow the mixture to ferment with the bung out, keeping the cask filled with sweetened water as it works over, until clear, then bung close or bottle. It makes an agreeable and healthful wine, affording a good profit, as nearly eighteen hundred gallons of wine may be obtained from each acre of well cultivated plants. The stalks will furnish about three-fourths their weight in juice.

RHINE WINE.—Take ten gallons of cider, ten gallons of pure spirits, ten gallons of water, mix and add half a gallon each of the juice of currants, whortleberries, cherries, elderberries, and gooseberries, two gallons of sugar syrup, with a very small portion of the essence of wine, and the essence of claret wine. Put the whole into a cask, ferment and fine with isinglass, then bottle.

SHERRY WINE.—To ten gallons of pure spirits, add twenty gallons of water, half a pound of the essence of Madeira wine, two gallons of sugar syrup, and half a gallon each of the juice of cherries, currants, whortleberries, and elderberries; mix, and treat in the same manner as before described.

CLARET WINE.—To ten gallons of pure spirits, add the decoction of one pound of orris-root in five gallons of water, to which add one gallon of raspberry juice, one gallon of sugar syrup, half a pound of the essence of claret; the coloring may be produced by boiling finely ground cochineal with cream of tartar in a little water, and adding the solution.

SHAM CHAMPAGNE.—Mr. Beecher gives the following formula for preparing this temperance drink: "Tartaric acid, one ounce, one good sized lemon, one ounce of ginger root, one and a-half pounds of white sugar, two and a-half gallons of water, and one gill of yeast. Slice the lemon and bruise the ginger; mix all except the yeast; boil the water and pour it upon them, and let it stand until cooled to blood heat; then add the yeast, and let it stand in the sun through the day; at night bottle, tying the corks, and in two days it will be fit for use."

IMITATION CHAMPAGNE.—Inject into a gallon of good white wine, one ounce of candy syrup, one-half ounce of tartaric acid, and one-half ounce of carbonated potassa, which will soon generate carbonic acid, and may be used within two hours after being prepared. This preparation is made and extensively sold as pure champagne in all of the large cities, and it may be kept in bottles for several weeks.

BRITISH CHAMPAGNE.—Fifty-six pounds of loaf sugar, forty-eight pounds of pale brown sugar, forty-five gallons of warm water, four ounces of cream of tartar; mix, and at a proper temperature add one quart of yeast; afterwards add five gallons of sweet cider. six or seven bruised bitter almonds, one gallon of pure spirits, and half an ounce of orris powder.

CIDER CHAMPAGNE.—To twenty gallons of good pale cider, add one gallon of pure spirits, seven pounds of honey or sugar; mix, and let them rest for a fortnight; then fine with half a gallon of skimmed milk, rack off and bottle. It will open very brisk, if properly managed. This is almost identical with the formula given under the chapter on champagne. This preparation is stronger, and costs a trifle more to prepare it.

SUMMER BEVERAGES.

PORTABLE LEMONADE, (for carrying in the pocket). —To one pound of loaf sugar, pounded finely in a mortar, add half an ounce of citric acid, half an ounce of lemon essence; mix thoroughly, and bottle for use. A rounding tablespoonful mixed with a half pint of cold water, will make a pleasant lemonade.

PERSIAN SHERBET.—Place upon plates, or separate pieces of paper, one pound of pulverized sugar, four ounces of super-carbonate of soda, three ounces of tartaric acid, and place in a moderately warm stove oven. Let them remain sufficiently long to dry out all of the dampness absorbed from the air; then rub about forty drops of the oil of lemon thoroughly with the sugar in a mortar or upon a board; then add the soda and acid, and continue the rubbing until all are thoroughly mixed; bottle and cork tight, and keep dry, so that the soda and acid will not neutralize each other. A tablespoonful of the mixture in a half pint glass, nearly filled with water, and quickly drank, makes a pleasant effervescing drink.

IMPERIAL CREAM NECTAR.—First take one gallon of water, eight pounds of loaf sugar, eight ounces of tartaric acid, one ounce of gum arabic; put them all in a suitable kettle and place on the fire, and when blood warm, put in four teaspoonfuls of flour, the whites of four eggs, well beaten together with the flour and half a pint of water. Allow the whole to boil for three minutes; take it off, and strain through a sieve, and when cold put the syrup in bottles. Three tablespoonfuls of the syrup put into a glass half or two-thirds full of water, and one-third of a teaspoonful of super-carbonate of soda, made fine, and stirred into the glass, will make a pleasant beverage.

If preferred, put into another bottle one pint of water, with eight ounces of super-carbonate of soda, which shake well, and this may be poured into the glass until it foams finely, instead of using the dry soda, as before directed.

SODA SYRUP.—Take one gallon of water, two ounces of gum arabic, eight pounds of crushed sugar, and mix in a brass or copper kettle; boil until the gum is dissolved, then skim and strain through white flannel, after which add six ounces of tartaric acid, dissolved in hot water, and flavor as preferred, with half an ounce, to each bottle, of the extract of strawberry, sarsaparilla, lemon, rose, orange, peach, or pine-apple. Take two or three tablespoonfuls of the syrup to three-fourths of a tumbler of water; mix half a teaspoonful of super-carbonate of soda, made fine, stir well and drink as it effervesces.

Another formula is to take two ounces of tartaric acid, two pounds of white sugar, the juice of half a lemon, and three pints of water. Boil them together five minutes, and when nearly cold, add the whites of three eggs, well beaten, with a half a cup of flour, and flavor with half an ounce of the essence of wintergreen, or any of the extracts before named. Bottle and keep in a cool place. Take two tablespoonfuls of the syrup for a tumbler of water, and add one-quarter of a teaspoonful of soda; stir it, and then drink.

CREAM SODA.—Take one quart of sweet, rich cream, one and a-half gills of water, five pounds of nice loaf sugar, four ounces of tartaric acid; warm gradually, so as not to burn, and bring it to a boiling heat; then remove it from the fire, for if it is cooked any length of time it will crystalize; use four or five teaspoonfuls of this syrup, instead of three, as in other syrups. Flavor with three-fourths of an ounce of the extract of vanilla, and with one-quarter of an ounce of the extract of nutmeg. Put in bottles, and keep in a cool place. When used, pour into a glass the usual quantity of water with the syrup, and stir into the mixture one-third of a teaspoonful of super-carbonate of soda, and it will be found to be very fine.

Another way of preparing cream soda, is to take three pints of water, four pounds of sugar, three nutmegs grated, the whites of ten eggs well beaten, one ounce of gum arabic, half an ounce of extract of lemon, or other flavoring fluids. These ingredients should be mixed and placed over a gentle fire, and well stirred for about thirty minutes, then removed from the fire, strained and divided into two parts; into one half put eight ounces of super-carbonate of soda, and into the other half, put six ounces of tartaric acid; shake well, and when cold they are ready for use. Pour three or four spoonfuls from both parts into separate glasses which are one-third full of cool water, stir each, and pour together, and drink at leisure.

GINGER POP.—Boil one-quarter of a pound of ginger root, bruised, in five gallons and a-half of water, put in while hot half an ounce of the extract of lemon, or a teaspoonful of lemon oil; mix the whole with a half ounce of tartaric acid, two and a-half pounds of white sugar, the whites of three eggs, well beaten, and one gill of yeast. Make over night, and in the morning skim and bottle, keeping out the sediment.

SPANISH GINGERETTE.—Boil in two gallons of water, two and a-half ounces of bruised ginger root, and ten lemons sliced, for the space of ten minutes. Then dissolve five pounds of white sugar and one and one-fourth ounces of cream of tartar in three gallons of cold water, and mix all together, and add half a pint of good yeast. Let it ferment over night; strain and bottle in the morning.

GINGER BEER.—Boil five ounces of bruised ginger in one gallon of water for thirty minutes, then add five pounds of white sugar, one gill of lemon juice, one quarter of a pound of honey, and three and a-half gallons of water. When cold, put in the white of an egg, well beaten, with one teaspoonful of lemon essence. Let it stand four days, then bottle. It will keep for months, much longer than if yeast were used.

Another formula is to take three gallons of water, add one quarter of a pound of bruised ginger root, two ounces of cream of tartar, and four pounds of sugar. Boil for a few minutes, and after cooling, add about one gill of fresh yeast; cover up the vessel with a thick flannel, and let it stand over night; add a little essence of lemon, strain it, and bottle the liquid in clean bottles. Tie the corks down by means of twine or iron wire, and on the fourth day the beer will be fit to drink.

English ginger beer, is prepared by boiling one and a half ounces of pulverized ginger, one ounce of cream of tartar, one pound of sugar, with three quarts of water; when cold, add a tablespoonful of yeast; the following day it is filtered, and drawn into bottles, and well corked.

Root beer.—Take hops, burdock, yellow dock, sarsaparilla, dandelion, spikenard, comfrey, licorice root, sassafras blossoms and bark, or any other root known to possess medicinal qualities, using such only as may be preferred and easily obtained. Let them be dry, and bruise each. Put half an ounce of each in a gallon of water; boil for about twenty minutes, and strain while hot, and add eight or ten drops of oil of spruce and sassafras, mixed in equal proportions. When blood warm, put in a gill of yeast, a pint of molasses, or a pound of sugar; let it ferment over night, and the following day the beer will be fit for drinking; or, after having worked for two hours, it may be bottled. It should be kept in a cool place.

Spruce beer.—For a cask of six gallons, mix well together three quarters of a pound of the purest essence of spruce, seven pounds of loaf sugar, made into a clarified syrup, and about one and a-half gallons of hot water. When sufficiently stirred and incorporated, put it into the cask, and fill up with cold water; then add about one-quarter of a pint of good ale yeast. Shake the cask well, and let it work for three or four days, after which bung it up. In a few days it may be bottled off in the usual manner, and in a week or ten days it will be fit for use. If, on bunging it close, about one-quarter of an ounce of isinglass be first dissolved in a little of the warmed liquor, or in cider, and stirred in, by way of fining, it will acquire a superior degree of clearness. In proportion to the coldness of the weather, the quantity of the yeast should be increased. Some use, instead of yeast, ale or beer grounds, the first time of making, and afterwards the grounds of their former spruce beer. In warm weather, very little ferment is required.

SPRUCE OR AROMATIC BEER.—For three gallons of water, put in three parts of molasses, three eggs, well beaten, and one gill of yeast. Into two quarts of the water, boiling hot, put fifty drops of any flavoring oil desired, or mix one ounce each of oils of spruce, sassafras, and wintergreen; then use fifty drops of the mixed oils. Mix all and strain; let it stand two hours and bottle. The yeast should not be added until the liquor cools down to a blood heat. Boiling water cuts oils for beers equal to alcohol.

SPRUCE BEER, may be prepared by putting into the common soda-water bottles about half a drachm (thirty grains,) of super-carbonate of soda, ten drops of the essence of spruce, and about half a drachm of crystalized tartaric acid; fill the bottle quickly with spring water, cork, and tie it with a twine.

LEMON BEER.—Water, thirty gallons, bruised ginger root, six ounces, one-quarter of a pound of cream of tartar. thirteen pounds of coffee sugar, one ounce of oil of lemon, or half an ounce of the oil may be used, and six good-sized lemons, sliced, and one pint and a-half of yeast. Boil the ginger and cream of tartar in two or three gallons of the water about twenty or thirty minutes; then strain it upon the sugar and oils or sliced lemons, which have been rubbed together. Fill up the cask with warm water, so the whole may be blood warm, then work up the yeast into a paste with five or six ounces of flour. Let it work over night, skimming off the yeast, and bottle for use; this will keep two or three weeks, and makes a very fine beverage.

SPARKLING GAS BEER.—Take seven and a-half gallons of water, two ounces of ginger, one ounce of allspice, half an ounce of cinnamon, one-quarter of an ounce of cloves, all bruised or ground, and two quarts of molasses; boil all together in two gallons of water, for fifteen or twenty minutes, then strain into a strong keg and add the balance of the water. Then put in one pint of yeast, shake it well together, and bung tight. If made over night, it will be ready for use the next day. In hot weather, draw in a pitcher with ice. If the keg is not strong, there is danger of its bursting the head out.

CORN BEER.—Take five gallons of cold water, one quart of sound, nice corn, two quarts of molasses; put all into a keg, shake well, and in two or three days fermentation will take place. Keep it bunged tight, and flavor with spruce or lemon, by pouring upon the oils one or two quarts of boiling hot water. The corn will last for making five or six times. It requires no yeast, and if it gets too sour, add molasses and water, in the same proportion.

VEGETABLE AND AROMATIC VINEGARS.

These are fancy vinegars, generally infusions of herbs or spices, and employed for fumigation, for the toilet, or as additions to the vinegar fluid in the quick process, for the purpose of imparting an agreeable flavor, rendering it more valuable for table use.

FORTY THIEVES' VINEGAR.—Macerate cloves, sage, rosemary, rue, pimento, calamus, caraway, nutmeg, each one ounce, in two gallons of strong vinegar, then add one-half ounce of camphor.

This vinegar is usefully employed in infectious diseases, and has received the above name from the circumstance that at Marseilles, where the pestilence once raged, the thieves, who used this vinegar, pillaged the city, and were not attacked by disease.

RASPBERRY VINEGAR AND STRAWBERRY VINEGAR.—These are prepared by mixing one pound of the respective fresh juices, with four gallons of good boiled vinegar, and setting aside for one or two days, and then filtering off the clear liquor; then putting it into bottles well corked, and bladder tied over them.

Both of these vinegars may be used as salad, or mixed with sugar and water as a summer beverage, and are quite cooling and wholesome.

CAMP VINEGAR.—Take four ounces of sliced garlic, two ounces of soy, two ounces of walnut catsup, one ounce of cayenne pepper, one ounce of black pepper, fifteen chopped anchovies, one gallon of vinegar, one drachm of cochineal. Infuse for one month, and strain.

MUSTARD VINEGAR, is made by soaking from eight to twelve ounces of black mustard in one quart of strong vinegar; press and filter. This is also employed as an addition to vinegar.

SHORT RULE TO MEASURE GRAIN.—An author says: "It is convenient to farmers and purchasers to have an easy and correct rule by which to measure corn in cribs. Here is one: Having leveled the corn in the crib, measure the length, breadth and depth, and multiply them together, and deduct from the product one-fifth, and you have the number of bushels in the ear; for shelled corn, take one-half. To be strictly correct, add half a bushel for every one hundred. Persons who are fond of cyphering, can test the correctness of this rule, by taking 1,878 solid inches for a foot, and 2,150 inches in a bushel, and see that the latter is nearly one-fifth larger than the former."

HOW TO MAKE FIVE GALLONS OF GRAPE WINE.—A correspondent of the Germantown *Telegraph* says the following receipt produces excellent wine: Express the juice from twenty pounds of grapes, and rinse the pulp and skins in as much water as will cover them; mash them and strain through a coarse cloth; add this to the juice, and put in two pounds of brown sugar to each gallon. When the sugar is dissolved, pour the whole into a keg, having the bunghole open, and let it stand where the temperature will be about 70°, until *fermentation ceases*, then bung tight, and let it rest for a month to settle, when it should be drawn off quietly, the keg well washed, and the wine returned to it, adding one pound good raisins; and if the wine does not seem sweet enough, two pounds of sugar may be added to the whole. The necessity of doing this depends upon the kind and quality of the grapes. The wine should remain until the keg is wanted the next season, when it may be bottled for use.

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PASTE THAT WILL KEEP A YEAR.—"Dissolve a teaspoonful of alum in a quart of warm water. When cold, stir in flour to give it the consistency of thick cream, being particular to beat up all the lumps; stir in as much powdered rosin as will lay on a dime, and throw in half a dozen cloves, to give a pleasant odor. Have on the fire a teacupful of boiling water; pour the flour mixture into it, stirring well all the time. In a few minutes it will be of the consistency of mush. Pour it into an earthen or china vessel; let it cool, lay a cover on, and put in a cool place. When needed for use, take out a portion, and soften it with warm water."

HINTS ON TRANSPLANTING SHRUBS.—In transplanting shrubs, as well as very small trees, a common error is to place them too deep in the earth. This has arisen from the circumstance that, by receiving more moisture, they often succeed better the first summer, at the expense, however, of their subsequent healthy growth. It is much better to plant shallow, imparting the necessary moisture by means of a deep, mellow soil beneath, and by mulching above. The material for the latter may be a short litter, manure, old tan, or leaf-mold. A surface consisting of these materials, raised to the height of a few inches, will occasion no injury whatever a year or two, and will admirably equalize the moisture of the soil. Manure used in this way operates beneficially, not only in preserving moisture, but also in increasing fertility; the properties of the manure being carried down in solution by rains, especially if applied in autumn or winter.

The contrast between the hard and baked surface, too often witnessed when the ground is left bare, and the moist and softened earth beneath a coat of manure or litter, can only be fully understood by means of actual observation. Its advantages were strikingly exemplified during the past hot summer. Young trees and shrubs that were protected from draught by a coating of litter and manure, have not suffered in the least, while those not protected are perishing. Staking may be in some instances necessary to prevent wind swaying, or a one-sided growth, where there are imperfect or unequal roots; but usually, if the shrub is furnished with good roots, and if care is taken while the earth is shoveled in to spread them all out like the ribs of an umbrella, they will serve to brace it evenly, and prevent a one-sided growth. Fixing by water, as it is termed, is often alone sufficient to preclude the necessity of staking.

Planting is most conveniently done by three persons, one spreading out the roots with his hands, and a second placing in the soil, while the third settles it by pouring water from the nose of a water-pot. Although soft at first, the soil in a few hours dries, and hardens sufficiently to hold the newly-set roots firmly. In transplanting roses and some other small shrubs, sufficient pruning of the top is rarely given. Climbing roses, and those generally which throw up rapid and vigorous shoots, will make a better growth by autumn if cut down to a few good buds when planted out, than if long portions of stems and branches are left; these, indeed, not unfrequently draw so hard upon the roots as to cause the death of the plant. On the other hand, I have seen shrubs transplanted in wet weather with entire success, after having grown six inches, by taking up all the roots carefully, and drenching the soil well with water, at the same time very freely shortening back the roots.—*Florist and Pomologist.*

A few hints on clarifying liquids and preserving them, also fruit and eggs.—Under Chapter VI, page 81, relating to the treatment of cider, the heating and stumming processes have been described. Reference also, has been made to albumen, blood, eggs, etc. It is possible that the clarification of liquids, such as cider and wine, may be effected in a less expensive manner than any of the processes therein described, by the use of albumen in the form of blood, by mingling it with the liquid, and coagulating it by heating the whole, which would entangle the impurities and cause both to rise to the surface as a scum. Again, the liquid may be charged, or impregnated with nitrogen, carbonic and sulphurous acid, or any innocuous gas. The impurities may then be precipitated by a subsequent heating and allowing the liquid to stand for a short time, when it may be bottled free from any sediment. Or after the liquid has been clarified or refined by any process, it may be charged with any innocuous gas and immediately bottled. The same plan may be adopted in bottling or canning fruit, by first filling the bottles or glass jars with the gas, and introducing the liquid to be treated, or the fruit with its juices, and immediately sealing to exclude the oxygen of the air.

The filling of vessels with such gases is easily effected on a large scale; methods for the purpose will readily occur to those conversant with such matters. The process of preserving small fruits by first subjecting them to the action of sulphurous acid gas, and subsequently drying the fruit by heated air, has long been practiced in many sections of Europe with great success. It is even supposed that fresh eggs, broken into jars containing nitrogen gas, and sealed in such an atmosphere, may be kept indefinitely without change.

It is furthermore known that many of the peculiar natural waters found in the mountainous regions of Russia, have the distinctive property of preserving fruits for many years, by simply keeping them immersed in such liquids and excluding the air. This property, also, has long been artificially applied to certain kinds of water, and fruit preserved by it, may be found at all seasons of the year, upon the tables of most of the crowned heads in Europe; we also understand that the same process has quite recently been introduced into this country; as it is nature's true plan, it must eventually supersede all others, and being exempt from the objectionable features found to exist in all of the processes heretofore practised, is is undoubtedly destined to become as popular here as elsewhere.

THE VINEGAR PLANT, and how to use it in the vinegar process.

Allusion has been made, on page 139, to "the celebrated vinegar plant," known as *penicillium glaucum*, which is a filamentous growth or a tough body of branching threads, appearing in fluids rich in sugar, and which are undergoing fermentation at a low temperature. Upon a careful examination it will be found that the upper surface is compactly arranged, below which the fibres are looser and gelatinous. If a small fragment of these fibres be put into sugar and water, they increase rapidly, and soon cover the surface of the solution, forming successive layers which become tougher and firmer as they rise upward. This plant is easily propagated by mixing half a pint of molasses with half a pound of brown sugar in three quarts of water, and after being thoroughly dissolved, place the mixture in a wooden tub or a stone pot, covering it over and allowing it to remain for the space of six or seven weeks behind a stove, or in some warm situation, when there will be found floating upon the surface of the mixture, a tough, fleshy substance, which is the vinegar plant sought to be produced. The mixture will have turned to vinegar, but of a poor quality. For the purpose of using this plant in the manufacture of vinegar, a vinegar fluid is prepared of sugar molasses and water, in the proportion as at first stated, and slightly warmed and placed in a tub, upon the surface some slats of wood are fixed to sustain the vinegar plant so that it may not lay wholly in the liquid ; the tub is then closely covered and set in a warm place, when in two weeks or more, the liquid will be found to have been converted into vinegar. This should be removed and a fresh supply of the vinegar fluid added, thereby continuing the manufacture, until the requisite supply of vinegar be obtained.

PRINTS ON APPLES AND PEARS.—A correspondent of the Charleston *Courier* gives the following: "I have just seen a very pretty and fanciful idea developed on pears and apples, in the orchard of a friend at West Roxbury, Mass. As you ramble among the trees, you are ever and anon saluted by an inscription on the fruit, done, as it were, by the hand of Nature herself. Here you meet with the familiar name of Mary or Alice, or a date, (1868,) in brief, everything that may suggest itself to your taste or fancy; and all done in the skin of the fruit, without abrasion or any foreign impression. The discovery was made by Hon. Arthur W. Austin, of West Roxbury, in 1851–2. He observed, during the former year, that apples did not redden in that part of the fruit where a leaf happened to lie upon it. In 1852, he cut letters from newspapers, and when the apples were yet green, he pasted them upon the fruit with gum tragacanth. The apples would redden in all parts not covered by the pasted letters. When the fruit had reddened to perfection, the letters were removed, and they would appear permanently outlined in green. So, again, when he pasted on the apple a paper in which the letters were cut out, the parts covered by the paper would be green, and the letters would appear distinctly turned in red, the green surrounding them. The experiment is a very pretty one, and produces a happy effect. Let our fruit growers try it."

The philosophy of preserving vegetables and fruits.—Merchants and others, dealing extensively in eggs, where the same are packed in boxes or barrels, and it becomes necessary to keep them for any length of time, have long been in the habit of changing the position of the packages in opposite directions on alternate days. This is done to prevent the yolks from settling by force of gravity, upon the inner membraneous lining of the shell, which accelerates the decay, and renders the eggs unfit for use.

A similar difficulty exists with the keeping of many kinds of fruits and vegetables, particularly with potatoes. As when they are allowed to remain in a barrel or bin through the winter, the force of gravitation causes the juices to settle in the bottom portion of the potato, which will remain fresh and plump, if undisturbed, until quite late in the season, while the upper portion will shrink or shrivel up from the loss of such juices. The excess of water thus accumulating will cause the potato to vegetate or sprout, as is well known, thereby measureably destroying its value for food.—With many kinds of fruit the juices have the same tendency to gravitation, thereby hastening the decay. This may be avoided by storing such vegetables and fruit in cool, dry, dark, well ventilated apartments, and securely packed in cylinder racks or bins, affixed upon horizontal wooden shafts, so that a person with a crank or other means, may change the relative position of thousands of bushels of fruits or vegetables in a very short time, with comparatively little labor, by simply giving half a revolution to the cylinder rack, daily. Vegetables and fruits treated in this manner, will keep, sound, fresh and plump, through the entire season, and for potatoes particularly, well pays the expense of a trial.

To Remove the Skin from Peaches.—Every one knows that there is a great loss of pulp in paring peaches with a knife; to obviate which, the following method has been suggested for treating them: Make lye as strong as possible of wood ashes and soft water. Fill a kettle with the lye, and when boiling rapidly, drop in twelve or eighteen peaches, and take out again almost immediately, and immerse them in a pail of cold water. Take one in your hand, and you perceive that the rind will slip off entirely, leaving a round, beautiful yellow ball; throw it immediately into another pail of pure water, and so proceed till all are done. This process will not injure the flavor of the finest peach, and once tried, the old fashioned way of peeling with a knife will not be again adopted. If the lye is not strong enough, put into the kettle two dipperfuls of clean wood ashes. This is an excellent way to rid small onions of their jackets preparatory to pickling them, also for peeling tomatoes.

SALTING DOWN CUCUMBERS FOR PICKLES.—Leave half inch of stem on cucumbers—wash them in cold water—immediately pack with salt in alternate layers, salt next to the wood; one barrel of salt to five of cucumbers. Fill barrel full, putting salt on top—cut a wide board so as just fit inside barrel—bore half a dozen half-inch holes through—place it on pickles with a stone on, which should weigh at least twenty-five pounds, so as to keep the pickles always in brine. Take off all scum which rises. Keep the barrel in the shade, and in four weeks take off the stone and fill to the top, as they will settle some. Put more salt on, head them up, and they are ready for market. It is best to have two sizes of pickles.

TO MAKE CITRON-MELON PRESERVES.—Cut the melon in what form you please; place in a kettle with water enough to cover, and boil until soft, previously adding a piece of alum; when done put to drain, and then place in a jar with sugar, an alternate layer of each; a pound of sugar to a pound of melon. When the sugar is dissolved, boil, adding lemon and ginger root to suit the taste.

Miscellaneous Recipes.

CANNING FRUITS—Peaches and Pears.—After parting and coring, put amongst them sufficient sugar to make them palatable for present eating,—about 3 to 4 lbs. only for each bushel; let them stand awhile to dissolve the sugar, not using any water; then heat to a boil, and continue the boiling, with care, from 20 to 30 minutes; or sufficiently long to heat through, which expels the air.

Berries, Plums, Cherries, Etc.—Raspberries, blackberries, whortleberries, currants, cherries, and plums, need not be boiled over 10 to 15 minutes, using sugar to make palatable, in all cases; as it must be put in some time, and it helps to preserve the fruit.

Strawberries.—For strawberries, put sugar ½ lb. for each lb. of berries; and proceed as for berries above.

Tomatoes.—For tomatoes, scald and peel them as for other cooking; then scald, or rather boil for about 15 minutes only, and can as above.

Cement for Canning Fruits.—Rosin 1 lb.; lard, tallow and bees-wax, each 1 oz.

CATCHUP—Tomato Catchup.—Take perfectly ripe tomatoes, ½ bushel; wash them clean and break to pieces; then put over the fire and let them come to a boil, and remove from the fire; when they are sufficiently cool to allow your hands in them, rub through a wire sieve; and to what goes through add salt 2 tea-cups; allspice and cloves, of each. ground, 1 tea-cup; best vinegar, 1 qt. Put on the fire again and cook one hour, stirring with great care, to avoid burning. Bottle and seal for use. If too thick when used, put in a little vinegar. If they were very juicy, they may need boiling over an hour.

CURRANT CATCHUP.—Nice fully ripe currants, 4 lbs., sugar 1½ lbs.; cinnamon, ground, 1 table-spoon; salt, with ground cloves and pepper, of each 1 tea-spoon; vinegar 1 pt.

WATER FILTER—HOME-MADE.—Rain water is much healthier than hard water as a beverage; and the following will be found an easy and cheap way to fit it for drinking purposes: Have an oak tub made, holding from half to a barrel, according to the amount of water needed in the family; let it stand on end, with a faucet near the bottom; or, I prefer a hole through the bottom, near the front side, with a tube in it, which prevents the water from rotting the outside of the tub; then put clean pebbles 3 or 4 inches in thickness over the bottom of the tub; now have charcoal pulverized to the size of small peas (that made from hard maple is best,) and put in half a bushel or so at a time; pound it down quite firmly, then put in more and pound again until the tub is filled to within 8 inches of the top; and again put on 2 inches of pebbles; then put a piece of clean white flannel over the whole top as a strainer.

CEMENTS.—CEMENT FOR CHINA, ETC., WHICH STANDS FIRE AND WATER.—With a small camel's-hair brush, rub the broken edges with a little carriage oil-varnish.

RUSSIAN CEMENT.—Much is said about cements, but there is probably nothing so white and clear, and certainly nothing better than the following: Russian isinglass dissolved in pure soft water, snow water is best, for it takes 12 hours to soften it by soaking in pure soft water, then considerable heat to dissolve it; after which it is applicable to statuary, china, glass, alabaster, etc., etc.

CEMENT, OR FURNITURE GLUE, FOR HOUSE USE.—To mend marble, wood, glass, china and ornamental ware—take water 1 gal.; nice glue 3 lbs.; white lead 4 ozs.; whisky 3 qts.

RAT DESTROYER—Rat Exterminator.—Flour 3 lbs.; water only sufficient to make it into a thick paste; then dissolve phosphorus 1 oz., in butter 1¼ oz., by heat. Mix.

Death for the Old Sly Rat.—Some rats get so cunning that it is almost impossible to overcome their shrewdness. Then get a few grains of strychnine, having a little fresh lean meat broiled; cut it into small bits, by using a fork to hold it, for if held by the fingers, they will smell them and not eat it; cutting with a sharp penknife; then cut a little hole into the bits, and put in a little of the strychnine, and close up the meat together again.

Rats.—To Drive Away Alive.—If you choose to drive them away alive, take potash pulverized, and put quite plenty of it into all their holes about the house. If the potash is pulverized and left in the air, it becomes pasty; then it can be daubed on the boards or planks, where they come through into rooms.

Scotch snuff, or pulverized cayenne pepper, mixed together, or separate; if freely put into their burrowing-holes, will certainly send them off, at a sneezing pace.

Rat Poison.—From Sir Huhphrey Davy.—A tasteless, odorless and infallible rat poison, he says, is made as follows: "Mix carbonate of barytes 2 ozs., with grease 1 lb."

WHITEWASH—Very Nice for Rooms.—Take whiting 4 lbs.; white or common glue, 2 ozs.; stand the glue in cold water over night; mix the whiting with cold water, and heat the glue until dissolved; and pour it into the other, hot. Make of a proper consistence to apply with a common whitewash brush.

Paint—To Make without Lead or Oil.—Whiting 5 lbs.; skimmed milk 2 qts.; fresh slaked lime 2 ozs. Put the lime into a stone-ware vessel, pour upon it a sufficient quantity of the milk to make a mixture resembling cream; the balance of the milk is then to be added; and lastly the whiting is to be crumbled upon the surface of the fluid, in which it gradually sinks. At this period it must be well stirred in, or ground as you would other paint, and it is fit for use.

White Paint—A New Way of Manufacturing.—The following was communicated by a man who was formerly a carpenter in the U. S. Navy: "Air-slaked lime, pulverized until the fineness of flour, which was then passed through a sieve. Rice boiled in a large kettle until the substance was drawn entirely out of the grain; the water, then of a plastic nature, was strained to separate the grain, etc., from the clear liquid. A tub, about the size of a half barrel, of the prepared lime and rice-water, was mixed with one gallon of linseed-oil; and the material had so much the appearance of paint that a novice could not have told the difference.

Black and Green Paint—Durable and Cheap, for Out-Door Work.—Any quantity of charcoal, powdered, a sufficient quantity of litharge as a dryer, to be well levigated (rubbed smooth) with linseed-oil. and when used, to be thinned with boiled linseed-oil. The above forms a good black paint.

By adding yellow ochre, an excellent green is produced, which is preferable to the bright green, used by painters, for all garden work, as it does not fade with the sun.

PICKLING FRUITS AND CUCUMBERS,—Pickling Apples.—Best vinegar 1 gal.; sugar 4 lbs.; apples all it will cover handsomely; cinnamon and cloves, ground, of each one tablespoon.

Pickling Peaches.—Best vinegar 1 qt.; sugar 4 lbs.; peaches, peeled and stoned 8 lbs.; spiced as desired, or as for apples.

Peaches—To Peel.—In peeling small peaches with a knife, too much of the peach is wasted; but by having a wire-cage, similar to those made for popping corn, fill the cage with peaches and dip it into boiling water, for a moment, then into cold water for a moment and empty out, going on in the same way for all you wish to peel. This toughens the skin and enables you to strip it off, saving much in labor as also the waste of peach. Why not, as well as tomatoes.

Pickling Cucumbers.—Pick each morning; stand in weak brine 3 or 4 days, putting in mustard pods and horseradish leaves to keep them green. Then take out and drain, covering with vinegar for a week; at which time take out and drain again, putting into new vinegar, adding mustard seed, ginger root, cloves, pepper and red pepper pods, of each about 1 or two oz., or to suit different tastes, for each barrel.

COLORS ON WOOLEN GOODS.

CHROMO BLACK—Superior to Any in Use.—For 5 lbs. of goods—blue vitrol 6 ozs.; boil it a few minutes, then dip the goods ¾ of an hour, airing often; take out the goods, and make a dye with logwood 3 lbs.; boil ½ hour; dip ¾ of an hour and air the goods, and dip ¾ of an hour more. Wash in strong suds.

BLACK ON WOOL—For Mixtures.—For 10 lbs. of wool—bi-chromate of potash 4 ozs.; ground argal 3 ozs.; boil together and put in the wool; stir well and let it remain in the dye 4 hours. Then take out the wool, rinse it slightly in clear water; then make a new dye, into which put logwood 3½ lbs. Boil 1 hour and add chamber-lye 1 pt., and let the wool lie in all night. Wash in clear water.

STEEL MIX—Dark.—Black wool—it may be natural or colored, 10 lbs.—white wool 1½ lbs. Mix evenly together, and it will be beautiful.

SNUFF BROWN—DARK, FOR CLOTH OR WOOL—For 5 lbs. goods—camwood 1 lb.; boil it 15 minutes, then dip the goods for ¾ hour; take out the goods, and add to the dye, fustic 2½ lbs.; boil 10 minutes, and dip the goods ¾ hour; then add blue vitriol 1 oz.; copperas 4 ozs.; dip again ¼ hour; if not dark enough add more copperas. It is dark and permanent.

WINE COLOR—For 5 lbs. goods—camwood 2 lbs.; boil 15 minutes and dip the goods ½ hour; boil again and dip ½ hour; then darken with blue vitriol 1½ ozs.; if not dark enough, add copperas ½ oz.

MADDER RED.—To each one lb. of goods—alum 5 ozs.; red, or cream of tartar 1 oz.; put in the goods and bring your kettle to a boil for ½ hour; then air them and boil ½ hour longer; then empty your kettle and fill with clean water, put in bran one peck; make it milk warm and let it stand until the bran rises, then skim off the bran and put in madder ¼ lb.; put in your goods and heat slowly until it boils and is done. Wash in strong suds.

GREEN—WITH FUSTIC.—For each lb. of goods—fustic 1 lb.; with alum 3½ ozs. Steep until the strength is out, and soak the goods therein until a good yellow is obtained; then remove the chips, and add extract of indigo or chemic, 1 tablespoon at a time, until the color suits.

BLUE—QUICK PROCESS.—For 2 lbs. goods,—alum 5 ozs.; cream of tartar 3 ozs.; boil the goods in this for one hour; then throw the goods into warm water, which has more or less of the extract of indigo in it, according to the depth of color desired, and boil again until it suits, adding more of the blue if needed. It is quick and permanent.

STOCKING YARN, OR WOOL TO COLOR—BETWEEN A BLUE AND PURPLE.—For 5 lbs. of wool bi-chromate of potash 1 oz.; alum 2 ozs.; dissolve them and bring the water to a boil, putting in the wool and boiling 1 hour; then throw away the dye and make another dye with logwood chips 1 lb., or extract of logwood 2¼ ozs., and boil one hour. This also works very prettily on silk.

N. B.—Whenever you make a dye with logwood chips, either boil the chips ½ hour and pour off the dye, or tie up the chips in a bag and boil with the wool or other goods, or take 2¼ ozs. of the extract in place of 1 lb. of the chips is less trouble and generally the better plan. In the above recipe the more logwood that is used the darker will be the shade.

SCARLET, WITH COCHINEAL.—For Yarn or Cloth.—For 1 lb. of goods—cream of tartar ½ oz.; muriate of tin 2½ ozs.; then boil up the dye and enter the goods; work them briskly for 10 or 15 minutes, after which boil 1½ hours, stirring the goods slowly while boiling; wash in clear water and dry in the shade.

PINK.—for 3 lbs. of goods—alum 3 ozs., boil and dip the goods one hour; then add to the dye, cream of tartar 4 ozs.; cochineal, well pulverized, 1 oz.; boil well and dip the goods while boiling, until the color suits.

ORANGE.—For 5 lbs. goods—muriate of tin 6 tablespoons; argal 4 ozs., boil and dip 1 hour; then add to the dye, fustic 2½ lbs.; boil 10 minutes, and dip ½ hour, and add, again, to the dye, madder 1 teacup; dip again ½ hour.

N. B.—Cochineal in place of madder makes a much brighter color, which should be added in small quantities until pleased. About 2 ozs.

LAC RED.—For 5 lbs. goods—argal 10 ozs.; boil a few minutes; then mix fine ground lac 1 lb. with muriate of tin 1¼ lbs., and let them stand 2 or 3 hours; then add half of the lack to the argal dye, and dip ½ hour; then add the balance of the lac and dip again

1 hour; keep the dye at a boiling heat, until the last half hour, then the dye may be cooled off.

PURPLE.—For 5 lbs. goods—cream of tartar 4 ozs.; alum 6 ozs.; cochineal, well pulverized, 2 ozs.; muriate of tin ½ tea-cup. Boil the cream of tartar, alum and tin, 15 minutes; then put in the cochineal and boil 5 minutes; dip the goods 2 hours; then make a new dye with alum 4 ozs.; Brazil wood 6 ozs.; logwood 14 ozs.; muriate of tin 1 tea-cup, with a little chemic; work again until pleased.

SILVER DRAB—Light.—For 5 lbs. goods—alum 1 teaspoon, and logwood about the same amount; boil well together, then dip the goods 1 hour; if not dark enough, add in equal quantities alum and logwood, until suited.

SLATE, ON WOOLEN OR COTTON—With Beach Bark.—boil the bark in an iron kettle, skim out the chips after it has boiled sufficiently, and then add copperas to set the dye. If you wish it very hard add more copperas. This is excellent for stockings.

EXTRACT OF INDIGO OR CHEMIC—To Make.—For good chemic or extract of indigo, finely ground, take oil of vitrol ½ lb., and stir into it indigo finely ground 2 ozs.; continue the stirring at first ½ hour; now cover over, and stir 3 or 4 times daily for 2 or 3 days; then put in a crumb of saleratus and stir it up, and if it foams, put in more and stir, and add as long as it foams; the saleratus neutralizes any excess of acid; then put into a glass vessel and cork up tight. It improves by standing. Druggists keep this prepared.

WOOL—To Cleanse.—Make a liquid of water 3 parts and urine 1 part; heat it as hot as you can bear the hands in it; then put in the wool, a little at a time, so as not to have it crowd; let it remain in 15 minutes; take it out over a basket to drain; then rinse in running water, and spread it out to dry; thus proceed in the same liquor; when it gets reduced fill it up, in the same proportions, keeping it at hand heat, all the time, not using any soap.

DARK COLORS—TO EXTRACT AND INSERT LIGHT—This recipe is calculated for carpet rags. In the first place let the rags be washed clean—the black or brown rags can be colored red, or purple, at the option of the dyer; to do this, for every 5 lbs. black or brown rags muriate of tin ¾ lb.; and the lac ½ lb.; mixed with the same, as for the red lac; dip the goods in this dye 2 hours, boiling ½ of the time, if not red enough add more tin and lac. The goods then can be made a purple, by adding a little logwood; be careful, and not get in but a very small handful, as more can be added if not enough. White rags make a beautiful appearance in a carpet, by tying them in the skein and coloring them red, green or purple; gray rags will take a very good green,—the coloring will be in proportion to the darkness of the mix.

DURABLE COLORS ON COTTON.

BLACK.—For 5 lbs. goods—sumac, wood and bark together, 3 lbs.; boil ½ hour and let the goods steep 12 hours; then dip in lime water ½ hour; then take out the goods and let them drip an hour; now add to the sumac liquor, copperas 8 ozs., and dip another hour; then run them through the tub of lime water again for 15 minutes, now make a new dye with logwood 2½ lbs., by boiling 1 hour, and dip again 3 hours; now add bi-chromate of potash 2 ozs., to the logwood dye, and dip 1 hour. Wash in clear cold water and dry in the shade. You may say this is doing too much. You cannot get a permanent black on cotton with less labor.

SKY BLUE.—For 3 lbs. goods—blue vitriol 4 ozs.; boil a few minutes; then dip the goods 3 hours, after which pass them through strong lime water. You can make this color a beautiful brown by putting the goods through a solution of prussiate of potash.

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